R8730-1.14 9/89

THE STATE OF THE STATES

1989

RENEW AMERICA

SEARCHING FOR COMMON GROUND

The media dubbed 1988 "the year of the environment." Medical waste washing up on beaches, news of global warming, reports of drinking water contaminated with pesticides, and other tragic events brought home the effects of long term damage to many of us. The question now is whether state and federal officials can take actions to effectively reduce future damage and threats to public health.

The year's disasters are the most visible part of chronic problems with long-established practices such as ocean dumping, overuse and misuse of pesticides, and widespread failure to enforce standards to protect air and water and land. It's business-as-usual pollution. What allows it to continue are major shortcomings in how we approach environmental protection — big picture problems that must be addressed if we hope to make long term progress.

On the eve of the 20th anniversary of Earth Day in 1990, we have a good opportunity to step back and examine the big picture needs and the vital roles public officials and citizens play in moving us forward. Perhaps most importantly, the 20-year perspective on how far we have to go can give us a sense of what is needed to sustain environmental protection beyond the media flash and firehouse political response that often runs out of funding and commitment long before the sparks are extinguished.

The 1989 *State of the States* report is a tool that can be used to examine the profile of each state's environmental protection efforts. It provides insight on big picture problems and covers major policies and programs in five topic areas: Forest Management, Solid Waste Recycling, Drinking Water, Food Safety, and Growth and the Environment. It is the last in a cycle of three annual reports which cover a total of 17 interrelated environmental topics.

The first report in 1987 pointed to the shift of responsibilities for many environmental programs from the federal government to the states under the policy of New Federalism. Along with this shift came a cutback in federal funds. The report noted that environmental progress of the previous 15 years had stalled and we had reached a turning point. The key question was whether states would have the resources to maintain and expand essential programs and win the cooperation of industry to reduce waste and pollution.

The 1988 report acknowledged the increasing costs of environmental protection and cleanup — far exceeding $300 billion. It also noted that in 1987, 33 states raised taxes and 24 cut budgets and reduced services and the cuts were likely to continue. The report pointed out that if local and state governments could not cover a significant portion of environmental protection, an even higher bill would ultimately show up in increased public health risks, degradation of the environment, and erosion of the quality of life.

Although the federal government must play a strong partnership role, the obvious conclusion is the need to develop many state level low-cost policies and programs, and to undertake enforcement that will shift more of the economic burden to polluters.

In the 1989 report we look at the need to recognize problems that are more a factor of institutionalized waste and inefficiency than of individual choice and lifestyle. In order to achieve long term goals we need to develop policies and programs to stop environmental degradation as business-as-usual. This means a broad range of pragmatic nuts-and-bolts policies from mandatory recycling to protection of aquifers.

In summary, the three reports find that among the many essential things we need to do, three steps are vital to permanent change. First is a fundamental matter of accounting. We have to balance productive value of resources with values that are not immediately monetary. This means developing full life-cycle costing for a chemical, or forest, or process, from beginning to end, and comparing that full value against the value of alternative chemicals, or processes, or uses of a forest. Second, we need to introduce greater accountability to environmental protection — making enforcement of laws and standards a top priority and shifting a larger share of the economic burden for protection from taxpayers to polluters. And third, we need to establish long term plans and goals based on the best scientific research and models available. The bottom line in all of this is to minimize risk by erring on the side of the environment even when some elements still remain unknown.

If 1988 was the "year of the environment" the 1990s should be the decade of environmental protection. These three reports can be used to develop agendas for action. In a small and specific way they contribute to our need for long term planning. But moreover, the information goes beyond the environmental tragedies presented by the media to provide detail on the big picture we so badly need to assess and the common ground we need to discover.

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Renew America is an outgrowth of Solar Action, an organization formed in 1978 to promote celebration of "Sun Day" around the world. The organization's mission was expanded in 1986 to provide new environmental tools for state and local decisionmakers in a continuing effort to build a sustainable society.

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EXECUTIVE SUMMARY

The most critical change needed is in our institutions.

Our understanding of environmental problems has begun to change dramatically. At one time pollution seemed to be mainly a local problem with relatively simple, short-term solutions. A factory stack billowing smoke was built higher to have soot carried further off by the wind. Garbage from one state with a shortage of landfill space was trucked to another for disposal.

The emergence of the global warming threat last year underscored how far we have come in beginning to recognize the real dimensions of environmental damage. What happens in one city or state often affects people far beyond its borders. The global warming issue also alerted us to the long-term commitment and planning needed to reduce pollution and clean up contaminated areas. Planning horizons must now extend thirty to fifty years for global warming and other environmental problems.

We are not accustomed to this kind of challenge. Presidential and gubernatorial administrations can change every four years, budget priorities undergo a wrestling match every year, and the political winds can shift from week to week. As a result programs are begun and then defunded. Laws and standards are put in place and then not enforced. Short-term planning horizons lead from one crisis to the next. And the slow degradation continues: resources are wasted, public health is put at risk, and the quality of life erodes.

Responsibility is often blindly laid at the doorstep of personal lifestyles and individual choice. While environmental protection programs shuffle along in a haphazard stop-and-go manner, the underlying belief appears to be that we will not see progress unless individuals choose to change. But the most critical change needed is in our institutions. Use of inefficient technologies and institutional policies that subsidize waste have led to pollution of the air, land, and water, and have geometrically increased our consumption of resources—often without our individual knowledge or support.

The amount of waste we have built into our resource use is evident. Since 1960 the population of the U. S. has increased 34 percent. During the same period the volume of solid waste has grown by 80 percent. Water consumption has increased by 51 percent. And energy use has increased by 69 percent.

To make informed environmental decisions leading to effective institutional changes, individuals need to know both their range of choices and the consequences of neglect. Recycling programs, energy-efficient lighting fixtures, less water-intensive landscaping, forestry plans, and consistent enforcement of standards and laws for safe food and drinking water do not require a drastic change in lifestyle. Yet it is just such measures that can form the basis for long-term institutional improvements. By developing and integrating long-term goals for environmental protection we can save resources, protect public health, and ultimately reduce the costs of pollution cleanup.

We are now at the bare beginning of such efforts. For instance, only six states have initiated water conservation programs. One of those states, Arizona, has targeted a goal to have a sustainable groundwater supply by the year 2025. In solid waste management, New Jersey has mandated that all of its counties recycle at least 25 percent of their waste within two years. And New York plans to reduce and recycle 50 percent of its waste by 1997. Iowa has established the nation's first state center to promote long-term

sustainable agriculture alternatives.

Such efforts are the result of increased public pressures for institutional change. However, the shift of responsibility for many environmental protection activities from the federal government to the states under the policy of New Federalism offers both opportunity and danger. States can develop plans tailored to local and regional conditions, and citizens can take part in developing those plans. But the federal government must maintain a strong support role by providing uniform minimum standards, backup enforcement of laws, technical assistance, and deadlines for action by all of the states. If this federal-state partnership is to make a consistent political commitment to environmental protection, it must also enlist the cooperation of industry while shifting to polluters more of the economic burden for programs to stop and correct environmental damage.

The topics in the 1989 State of the States report—Forest Management, Solid Waste Recycling, Drinking Water, Food Safety, and Growth and the Environment, indicate where some of the institutional changes can take place.

Forest Management

Forests cover one-third of the nation, providing habitat for more than 80 percent of our wildlife species and offering the setting for much of our outdoor recreation. Forests also play a crucial role in protecting water quality by stabilizing watersheds, and by reducing global warming through the absorption of carbon dioxide from the air. According to the U.S. Forest Service there has been a five percent decrease in forested area over the past 25 years due to fires, diseases, timber harvesting and clearing of land for agriculture. But aside from natural threats to forests, one of the chief man-made problems is the creation of a forest monoculture by replanting after timber harvesting with even-aged seedlings, which decreases forest diversity and disturbs the ecosystem. As a result, policy makers are often caught between environmentalists and the timber industry in heated debates over production versus protection of forest areas.

Federal agencies such as the Forest Service and Bureau of Land Management have been highly visible battlegrounds for many forest management controversies. But equally important is the role of the state governments in forest land management. Approximately three-fourths of forest land that can produce commercially valuable trees is privately owned. States have management authority over these lands, but most states have only minimal forestry laws and regulations and many of these were passed more than 25 years ago.

With timber harvesting on federal lands in decline, more production pressure will be placed on private forest lands under state jurisdiction. Seven states have enacted laws that attempt to balance a wide range of forest values that include timber production, wildlife, forest diversity, recreation and aesthetics.

The six states with the best forest management programs are Washington, California, Idaho, Oregon, Massachusetts, and Minnesota.

Solid Waste Recycling

The United States currently produces more than 11 billion tons of nonhazardous solid waste each year. Industry generates the greatest portion of the waste stream—an estimated 7.6 billion tons. The industrial waste stream, which is disposed of mainly on-site, has received little public scrutiny or regulation. By comparison, municipal solid waste, which has been traditionally disposed of in public landfills, amounts to 160 million tons per year. Most state and local policy-making has focused on this waste, due to decreasing disposal capacity, soaring costs, and strong citizen opposition to new landfills and incinerators. As environmental pollution from landfills and incinerators has become more apparent, policy makers across the country are turning to what could become very far-reaching programs for waste reduction and recycling.

Eight states are implementing comprehensive recycling programs. Some analysts claim that the municipal solid waste stream can be reduced by 20 percent by combining packaging design and process modifications that favor reusable and durable containers. Analysts also argue that 70-80 percent of the waste stream can be recycled. Approximately 70 percent of the municipal waste stream is considered organic: 18-20 percent yard waste, 8-17 percent food waste, 4-8 percent wood, and 30-40 percent paper and paperboard. Currently an average of only ten percent of the waste stream is recycled.

Long-term success for recycling programs depends on the ability to create and sustain a market for recycled materials. States can play a significant role at every level: by establishing recycling programs, consuming recycled products, and providing incentives to spur market creation.

The states with the best programs to promote solid waste recycling are Oregon, Connecticut, Florida, Iowa, Illinois, Minnesota, New Jersey, New York, Pennsylvania, Rhode Island, and Wisconsin.

Drinking Water

Americans consume an estimated 119 million gallons of drinking water each day. Half of the drinking water supply comes from surface water (lakes, and rivers) and half from groundwater

(underground aquifers). The federal government sets drinking water standards and oversees enforcement. States have a primary role in enforcement of the standards, but their record is dismal. In 1987, despite more than 100,000 violations by public water systems affecting 41 million Americans, 19 states took no formal enforcement action against violators of the federal Safe Drinking Water Act's public health standards and reporting requirements. Formal enforcement action against violators by EPA is also rare.

According to one EPA official, the rising costs of protecting water quality are leading to a crisis. New federal regulatory requirements along with declining federal funding are increasing the pressure on already hard-pressed state water quality programs as well as on public water supply systems. A deepening funding shortfall is predicted. By the mid-1990s states will need more than $300 million in additional revenue annually to maintain their current programs and meet new requirements.

Nevertheless, some states are moving ahead to protect water supplies at their source before they become contaminated. Their efforts include development of groundwater protection strategies, legislation to reduce groundwater pollution from leaking underground storage tanks and leaching pesticides, programs to reduce urban and agricultural runoff pollution of lakes and streams, and wellhead protection programs.

The states with the best overall programs to protect drinking water supplies and sources are Maine, Massachusetts, New Jersey, California, and North Carolina.

Food Safety

In a recent assessment the Environmental Protection Agency ranked pesticide residues as the third most important environmental problem in the U.S. in terms of cancer risk. Between 1982 and 1985 federal and state monitoring programs detected more than 110 different pesticides on commonly-eaten fruit and vegetables. Thousands of other compounds not routinely monitored, such as polychlorinated biphenyls (PCBs) and heavy metals, also make their way into the food chain and are often found in meat, poultry, fish, and shellfish. Meat and poultry may also contain antibiotics and hormones that are administered routinely to animals in the production process. Another issue of emerging concern is the controversy over irradiation of food, which supporters claim will improve storage and preservation.

Given substantial gaps in monitoring, increasing contamination of fish and shellfish, and food irradiation concerns, a few states have taken on a growing responsibility to protect food supplies. Especially in the area of reducing pesticide use, states have a vital role to play in promoting sustainable agriculture, Integrated Pest Management, biological pest controls, and organic farming. Action undertaken by the states can also spur the federal government to improve its standards and monitoring.

Currently, five states with the best programs for improving food safety are Iowa, California, Minnesota, South Carolina, and Wisconsin.

Growth and the Environment

To many people the American Dream appears to be at odds with a healthy environment. But the question is not whether communities will grow—but how they will grow, and at what cost. In the past, impacts of growth were seen largely as a function of population expansion. Energy use, water consumption, and solid waste generation seemed to have per capita equations fixed to an idea that individuals consume a set amount of resources. However, the impact of population and economic growth on the environment is more complex.

Conservation of natural resources is a first step in managing the pressures of growth and turning around the notion that we live in a "throwaway" society. New technologies and progressive institutional policies can be applied to energy use, water use, and solid waste management. However, statewide land-use planning is one of the most important areas in which to integrate long-term goals to protect the environment.

States typically address the environmental pressures generated by urbanization and rapid economic development through a patchwork of programs targeting particular problems, including programs to protect prime farmlands, wetlands, coastal zones, and aquifers. Some states have enacted more comprehensive growth-management laws that give state and regional governments authority over certain local land-use decisions.

New efficient technologies and environmental policies are not the ultimate solutions to population and economic growth problems. But they are essential in deflating major growth pressures.

The eight states with the best programs to address the impacts of growth on the environment are Oregon, California, Wisconsin, Massachusetts, Florida, New Jersey, Minnesota, and New York.

The Final Scores

	Percent of Possible Points	*Total Points (out of 50)*	*Rank*
California	84	42	1
Oregon	78	39	2
Minnesota	76	38	3
Massachusetts	74	37	4
Wisconsin	74	37	
Iowa	68	34	6
New Jersey	68	34	
Florida	64	32	8
Maryland	64	32	
Connecticut	60	30	10
Washington	60	30	
Maine	58	29	12
North Carolina	58	29	
New York	56	28	14
Pennsylvania	56	28	
Rhode Island	56	28	
Virginia	56	28	
Georgia	54	27	18
Illinois	54	27	
Vermont	54	27	
Michigan	52	26	21
Idaho	50	25	22
Missouri	50	25	
Ohio	48	24	24
South Carolina	48	24	
Colorado	44	22	26
Delaware	44	22	
Hawaii	44	22	
New Hampshire	44	22	
Texas	42	21	30
Arizona	40	20	31
Kansas	40	20	
Nebraska	40	20	
North Dakota	38	19	34
Montana	36	18	35
Alaska	34	17	36
Oklahoma	34	17	
Alabama	32	16	38
Mississippi	32	16	
New Mexico	32	16	
Indiana	30	15	41
Kentucky	30	15	
West Virginia	30	15	
Wyoming	30	15	
Nevada	28	14	45
Arkansas	26	13	46
South Dakota	26	13	
Utah	24	12	48
Tennessee	22	11	49
Louisiana	20	10	50

Reading the Rankings

The chart below lists the scores for the top ten states. The last column shows the final scores—the total of all the five categories. Each category has been equally weighted and has been ranked on a scale of 1 to 10. Each of the individual scores was derived from several subcategories, listed on matrix pages 8, 14, 20, 26, 28, 34, and 36, and additional data published in supplementary focus papers. The maximum possible total points for one state is 50.

	Forest Management	Solid Waste	Drinking Water	Food Safety	Growth	Total
CA	9	7	8	9	9	42
OR	9	10	5	5	10	39
MN	8	8	6	8	8	38
MA	8	7	9	5	8	37
WI	6	8	7	8	8	37
IA	3	8	7	10	6	34
NJ	5	8	9	4	8	34
FL	6	8	4	6	8	32
MD	7	6	6	6	7	32
CT	3	9	6	5	7	30
WA	10	5	3	6	6	30

1989 State Winners in Each Category

★ **First Place - California**

☆ Forest Management - Washington
☆ Solid Waste Recycling - Oregon
☆ Drinking Water - Maine
☆ Food Safety - Iowa
☆ Growth and the Environment - Oregon

FOREST MANAGEMENT

Policy-makers are caught in heated debates over production versus protection of forest areas.

A nationwide television audience watched more than one-third of Yellowstone National Park go up in flames last summer, as the worst forest fires of the century blazed across the West. In the end the fires burned five million acres and took 50,000 firefighters and $600 million to bring under control. The devastation stunned most Americans and the prospect of a charred landscape that may take decades to restore underscored the long-term importance of forests to our ecosystem.

Forests cover one-third of the nation, providing habitat for more than 80 percent of our wildlife species and offering the setting for much of our outdoor recreation. They play a crucial role in protecting water quality by stabilizing watersheds, and reduce the rate of global warming by absorbing carbon dioxide. Forests are also home to unique ecosystems, including most wilderness areas and national parks.

At the same time forests supply the nation with one of its leading agricultural commodities —timber. In 1985, U.S. lumber and wood products sales totaled more than $54 billion, and the industry employed more than 600,000 people. In addition to providing the basic materials for the housing, furniture, and paper manufacturing industries, trees are also the source of chemicals such as turpentine, ethyl alcohol, vanillin, and synthetic resins.

Despite this significance, timber harvesting often conflicts with other uses of valuable forest resources. The roads and machines which are needed to reach trees and deliver them to mills, can disturb wildlife habitat, cause soil erosion, and destroy wilderness. Once trees are cut, reforestation is not simple or certain and full regeneration may take decades or centuries, if it occurs at all.

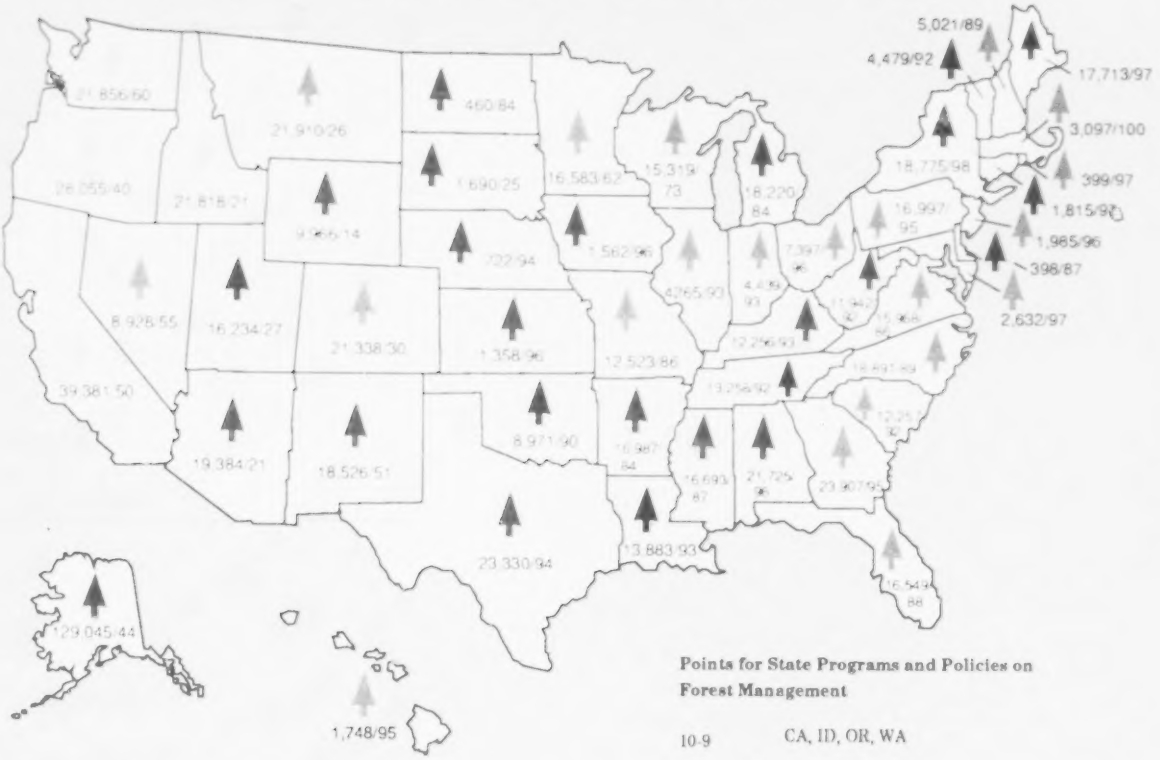
According to the U.S. Forest Service there has been a five percent decrease in forested area over the past 25 years due to fires, diseases, timber harvesting, and clearing of land for agriculture.[1] But aside from natural threats to forests, one of the chief man-made problems is the creation of a monoculture by restocking with even-aged seedlings, which decreases forest diversity and disturbs the ecosystem. As a result, the timber industry is often at odds with environmentalists over how our forests should be used, and public policy-makers are sometimes caught in heated debates over production versus protection of forest areas.

One place where this conflict is being played out is in the old-growth forests of the Pacific Northwest. These ancient ecosystems contain trees seven centuries old and 250-feet high, and are said to produce more living matter than even tropical rain forests.[2] They also hold most of the remaining sawtimber in a region whose economy has relied on timber for more than a century. The timber industry believes its economic survival is imperiled if these forests cannot be harvested. Environmentalists contend that further cuts will irreparably alter the ecosystem, eliminating critical habitat for species such as the spotted owl.

In the Northwest and other regions of the country much valuable timber is found on land managed by the federal government. This makes federal agencies such as the Forest Service and Bureau of Land Management highly visible battlegrounds for many forest-management controversies.

Equally important is the role of states in forest land management. Approximately three-fourths of forest land that can produce commercially valuable trees is privately owned.[3] States have management authority over

STATE AND PRIVATELY OWNED FOREST LAND



Key to Reading the Map

Example: Washington - Best Overall
10 Points for Programs and Policies

21,856/60 — 21,856,000 acres of forest land/ 60% of forested land is under state jurisdiction (includes land owned by state, timber industry, and private landowners)

Points for State Programs and Policies on Forest Management

10-9		CA, ID, OR, WA
8-7		MA, MD, MN
6-5		CO, FL, GA, HI, IL, IN, MO, MT, NC, NH, NJ, NV, OH, PA, RI, SC, VA, WI
4-3		AK, AL, AR, AZ, CT, DE, IA, KS, KY, ME, MI, MS, ND, NE, NM, NY, SD, TX, VT, WV, WY
2-1		LA, OK, TN, UT

Source: Renew America, 1989

these lands, but to date only seven have passed forest practice acts that address a broad range of forest resources.

. . . . three-fourths of forest land that can produce commercially valuable trees is privately owned.

Most states have only minimal forestry laws and regulations, and many of these were passed more than 25 years ago to prevent federal intervention in state and private forestry. In some cases the laws were written by timber industry representatives.4

Federal involvement in forest management began in the late 19th century and was intensified during Teddy Roosevelt's Administration under the leadership of Gifford Pinchot. Federal assistance for state and private forestry was later established with the Clark-McNary Act of 1924, which initiated a cooperative fire control program, provided 50-50 cost-share assistance to private landowners, and introduced the idea of tax breaks to promote reforestation and sound forest-management practices.5 These remain today as the main public-policy tools used for influencing private forest practices. In 1978, federal law was consolidated in the Cooperative Forestry Assistance Act and currently the federal Forest Service provides financial and technical assistance to state forestry programs, which in turn assist private landowners.

Forest resources vary greatly across the country and state forestry programs reflect these differences. In the Pacific North-

FOREST MANAGEMENT MATRIX

	1 TOTAL FOREST LAND	2 LAND AREA COVERED BY FORESTS	3 FOREST LAND FEDERALLY OWNED	4 FOREST LAND STATE OWNED	5 FOREST LAND OWNED BY TIMBER INDUSTRY	6 FOREST LAND PRIVATELY OWNED	7 TIMBER INDUSTRY RANK	8 FORESTRY BUDGETS/STAFF	9 FORESTRY LAWS	10 REFORESTATION POLICIES	11 WATER QUALITY	12 WILDLIFE HABITAT
Alabama	21,725	67%	4%	1%	21%	74%	2nd/1st	5/15/ 20		ep,ta,fi	Local (2)	ep,ta
Alaska	129,045	36%	55%	29%	7%	8%	2nd/3rd	1/35/36	LAW	lr	State (2)	None
Arizona	19,384	27%	79%	12%	0%	9%	9th/10th	38/48/46		ep,ta	Local (2)	ep,ta
Arkansas	16,987	51%	16%	2%	25%	57%	2nd/2nd	13/25/19		ta	Local (2)	ep,ta
California	39,381	39%	50%	1%	12%	37%	9th/7th	2/2/2	LAW	fi,ep,ta,vg,lr	Local (5)	ep,ta,vg,fi,lr
Colorado	21,338	32%	69%	2%	0%	28%	10th/10th	29/22/26		ep,ta	Local (2)	ep,ta
Connecticut	1,815	59%	1%	11%	0%	86%	10th/10th	41/45/40		ep,ta	None(2)	ep,ta
Delaware	398	33%	14%	6%	8%	73%	3rd/3rd	50/50/50		ti,ta	None(0)	None
Florida	16,549	48%	10%	5%	33%	50%	6th/6th	12/8/ 6		ep,ta,ti,fi	Local (0)	ep,ta,vg,lr
Georgia	23,907	65%	6%	<1%	21%	73%	3rd/4th	4/4/ 12		ep,ta,vg,fi	Local (2)	ep,ta,vg
Hawaii	1,748	43%	1%	43%	31%	21%	5th/5th	42/32/41	REG	fi,ta	None(0)	ta,lr
Idaho	21,818	41%	77%	6%	6%	9%	2nd/2nd	32/20/13	LAW	ep,ta,vg,ti,lr	State (4)	ep,ta,vg,lr
Illinois	4,265	12%	7%	3%	<1%	89%	10th/10th	36/27/31		ta,ti,fi	Local (1)	ta,ti,fi
Indiana	4,439	19%	8%	7%	10%	76%	8th/10th	35/17/21		ep,ta,fi	Local (2)	ep,ta,ti,lr
Iowa	1,562	4%	3%	3%	1%	92%	7th/9th	44/38/41		ep,ta,ti,fi	None(0)	ep,ta,fi
Kansas	1,358	3%	4%	1%	0%	95%	9th/9th	45/44/49		ta, ep	None (0)	fi, ep, ta
Kentucky	12,256	48%	8%	1%	2%	90%	9th/10th	21/28/28		ep,ta,ti,fi	Local (2)	ep,ta
Louisiana	13,883	49%	6%	2%	31%	60%	3rd/4th	18/33/30		ep,ti,fi	Local (0)	ep
Maine	17,713	90%	<1%	<1%	47%	49%	1st/1st	7/29/ 9	REG	ep,ta	State (3)	ep,ta
Maryland	2,632	42%	1%	7%	5%	85%	6th/9th	39/23/28		ta,ti,fi,lr	Local (4)	ep,ta,fi,ti
Massachusetts	3,097	62%	<1%	13%	2%	85%	9th/9th	37/14/37	LAW	ep,ta,ti,lr	Local (4)	ep
Michigan	18,220	50%	14%	20%	11%	53%	8th/7th	10/13/ 15		ep,ta,vg,ti,fi	Local (3)	ep,ta,fi
Minnesota	16,583	33%	21%	22%	5%	35%	6th/3rd	17/7/5		ep,ta,ti,fi	Local (4)	ep,ta,fi,ti
Mississippi	16,693	55%	9%	2%	20%	65%	2nd/1st	11/10/ 08		ep,ta,fi	Local (0)	ep,ta,vg
Missouri	12,523	28%	10%	5%	2%	79%	9th/8th	23/16/21		ep,ta,vg,ti,fi	None(2)	ep,ta
Montana	21,910	24%	73%	3%	7%	16%	1st/2nd	31/24/17		ep,ta,ti,fi	Local (3)	ep,ta
Nebraska	722	1%	6%	6%	0%	88%	9th/11th	46/41/43		ep,ta	None(0)	ep,ta,fi
Nevada	8,928	13%	*45%	*4%	*6%	*45%	No Data	26/47/43	LAW	ta,lr	Local (3)	vg,ta
New Hampshire	5,021	88%	10%	3%	14%	72%	3rd/3rd	33/34/38		ep,ta	Local (4)	ep,ta
New Jersey	1,985	43%	2%	13%	1%	82%	9th/9th	40/37/23		ep,ta,fi	Local (3)	ta,lr
New Mexico	18,526	24%	49%	5%	0%	46%	7th/8th	25/43/35	REG	ta,vg,lr	Local (2)	ta
New York	18,775	62%	1%	21%	11%	66%	10th/11th	6/11/ 10		ta,ti,fi	Local (2)	ta
North Carolina	18,891	61%	10%	2%	13%	74%	5th/7th	8/9/ 13		ep,ta,vg,ti,fi	State (3)	ep,ta
North Dakota	460	1%	15%	6%	0%	78%	7th/7th	49/46/47		ta	None(1)	None
Ohio	7,397	28%	2%	3%	6%	87%	9th/10th	28/21/16		ep,ta,vg,ti	Local (2)	ep,ta,vg
Oklahoma	8,971	20%	10%	2%	22%	66%	10th/10th	27/39/32		ep,ta	Local (1)	ta
Oregon	28,055	46%	58%	3%	21%	16%	1st/1st	20/3/3	LAW	lr	State (3)	ta
Pennsylvania	16,997	59%	3%	20%	6%	69%	8th/8th	9/5/ 7		ep,ta	Local (3)	ep,ta
Rhode Island	399	60%	0%	12%	0%	85%	9th/11th	48/36/34		ta	None(2)	ta
South Carolina	12,257	64%	7%	1%	18%	73%	4th/3rd	22/18/18		ep,ta,vg,fi	Local (1)	ep,ta,vg
South Dakota	1,690	3%	74%	5%	4%	16%	5th/4th	47/40/38		ta,fi	Local (0)	None
Tennessee	13,258	50%	6%	2%	9%	81%	8th/6th	19/26/26		ep,ta,vg	Local (2)	ta
Texas	23,330	14%	6%	<1%	33%	60%	8th/8th	3/19/ 25		ep,ta,fi	---- (0)	None
Utah	16,234	31%	69%	10%	0%	17%	9th/10th	30/49/45		ta,ti,fi	Local (1)	ta
Vermont	4,479	76%	7%	6%	8%	78%	2nd/2nd	34/30/32		ep,ta,fi	State (3)	None
Virginia	15,968	63%	11%	1%	12%	73%	3rd/6th	14/12/10	REG	ep,ta,fi,lr	Local (2)	ep,ta,vg
Washington	21,856	51%	*39%	*10%	*25%	*25%	2nd/2nd	16/1/1	LAW	ta,lr	State (4)	ta
West Virginia	11,942	78%	8%	2%	8%	82%	5th/7th	24/31/23		ep,ta	Local (2)	ep,ta
Wisconsin	15,319	44%	11%	5%	8%	60%	2nd/3rd	15/6/4		ep,ta,ti,fi	Local (2)	ep,ta
Wyoming	9,966	16%	86%	2%	1%	11%	No Data	43/42/48		ep,ta	Local (0)	ep,ta

west, vast coniferous forests dominate the landscape and states must take into account unique ecosystems such as the old-growth forests, a prosperous forest products industry, large federal landholdings, and the potential of massive forest fires. In most eastern states, forests are smaller and stocked with less commercially valuable trees, so these states emphasize non-industrial management and assistance to landowners such as farmers.

A different situation exists in the South, where soil conditions and climate conducive to growing valuable trees have attracted a large and fast-growing timber industry. In 1985, Alabama and Mississippi ranked lumber and paper manufacturing second in employment and first in output, and in Georgia and Louisiana they were third and fourth, respectively. Recent trends indicate that the timber industry is shifting its operations to the South due to declining availability of timber in the Pacific Northwest.[6]

A few states own and manage a significant amount of forest land themselves, either in state parks or state forests. Most of these are in the Northeast and Midwest, where tourism associated with forest recreation provides substantial income to local communities. Minnesota, for example, owns 22 percent of its forest land, New York 21 percent, and Michigan and Pennsylvania 20 percent.

States spend most of their forestry effort on fire control, which on average accounts for 60 percent of program funding.[7] The seriousness of fire problems depends on geography and annual climate conditions, making comparisons of state fire-management efforts difficult. Aside from fire control, essential state program areas that affect long-term forest management include non-fire forestry budgets and staffs, forestry laws and regulations, financial and tax assistance to private land owners, and forest-resource planning.

Ultimately, what can be achieved with state programs relies heavily on budget considerations. State forestry program budgets in recent years have declined in real dollar terms due to cutbacks in federal spending. However, some states have been able to maintain spending levels by offsetting the lost federal share with increased revenue from timber sales, seedling prices, technical assistance and fire service charges.[8]

Comparisons of forestry budgets and staffs (excluding fire management) show some states doing much better than others. Washington, for example, ranked sixteenth nationally in total state and private forest land, but first overall in both budget and staff in 1988. Likewise, Oregon ranked twentieth in state and private forest land, but third in budget and staff. Other states with strong budgets and staffs include Minnesota, Wisconsin, Idaho, Maryland, Rhode Island, Massachusetts, and Indiana. Among the states with the lowest funding relative to their forest resource were Alaska, Alabama, Maine, Louisiana, Texas, Nevada, and New Mexico.

Seven states have enacted laws that attempt to balance a wide range of forest values that include timber production, wildlife, water quality, forest diversity, recreation, and aesthetics. They are Alaska, Washington, Oregon, California, Idaho, Nevada, and Massachusetts.

MATRIX KEY

1. Total Forest Land: Thousands of acres (1987).

2. Land Area Covered by Forests: As percent of state's total land area.

3-6. Forest Land Ownership: percent of state's forest land owned by: federal government (column 3), state government (column 4), timber industry (column 5), and other private landowners (column 6). * = percentages are based on commercial forest acreage (land capable of producing commercial timber).

7. Timber Industry Rank: In terms of employment/dollar value. Ranking done in comparison with other manufacturing industries in each state (1985).

8. Forestry Program Budgets and Staffs: Rank of state in amount of forest land under its jurisdiction/rank of state forestry program budget (excluding fire expenditures)/and rank of program staff in number of managerial and professional employees (1987-1988).

9. Forestry Laws: Law= states with comprehensive, modern forest practice laws, Reg= states with significant forest practice regulations (1986).

10. Reforestation Policies: State response to survey on policies to promote reforestation on private forest land. ep= educational program, vg= voluntary guidelines, fi= financial incentive, ti= tax incentive, lr= legal regulation, ta= technical assistance (1985).

11. Water Quality: State's responses to survey on water quality problems due to forest practices. State= more than 50% of state waters degraded, Local= less than 50%, None= no significant degradation. In parentheses, evaluation of forest–practice water quality protection policies (5= highest score, 1= lowest).

12. Wildlife Habitat: State's response to survey on policies to protect wildlife habitat on private forest land. (Abbreviations same as column 10.)

For sources, see page 45.

In general, these comprehensive laws set up a state Board of Forestry to promulgate rules governing forest practices on private land. Timber owners are required to file plans and receive approval before commencing harvests. They must also meet specified levels of regeneration after harvest, mitigate damage to wildlife habitat, soils, and water quality, and protect aesthetic appearance. The lead enforcement role for these laws is usually assigned to the state forestry programs, giving them the power to issue stop-work orders or seek criminal or civil penalties through the courts against violators. With the exception of Massachusetts, the forestry agencies are also authorized to repair damages to forest resources when violators fail to pay for it themselves.9

Among the seven laws, California's is widely regarded as the most comprehensive. California requires licensing of all timber operators and imposes strict limitations on timberland conversions. The state also gives the public the right to comment on any harvesting plan and receive a written response before the plan is approved. Additionally, any county with approved regulations can request a hearing on a harvesting plan or appeal a plan's approval.10

Although California's law is highly regarded, its implementation has been controversial. Environmentalists believe the forestry agency approves plans with only minimal consideration for non-timber values. Environmental groups have filed several lawsuits, which contend that the Board of Forestry has not adequately addressed the cumulative impacts of logging and forest roads on old-growth forests, wildlife areas, and critical watersheds.11

One state that has reached a compromise among its diverse forest constituencies is Washington. In 1987 the state's timber industry, environmentalists, natural resource agencies and Indian tribes were brought together through a unique mediation process. The resulting document—the Timber, Fish and Wildlife Agreement—was approved by the Board of Forestry, and superseded the forest practice rules then in place. Among its innovative actions was the creation of interdisciplinary teams to make on-site reviews of forest practices, the reorganization of the Department of Natural Resources to improve enforcement, and the doubling of time for harvest application review.

Seven states have enacted laws that attempt to balance a wide range of forest values . . .

Studies from the early 1980s show that states that have passed forestry practice acts have had high levels of reforestation In Oregon, for example, reforestation requirements were met 95 percent of the time, resulting in 30-40 percent more reforestation since the state's law was passed. In California reforestation requirements were met 99 percent of the time, and 25 percent more reforestation occurred following passage of its Act.12

Despite these successes, none of the seven states strictly enforces its forestry law, preferring to rely on landowner cooperation rather than formal sanctions against violators. Through 1985, Massachusetts had not imposed any fines or revoked any timber licenses, and Alaska reported only three or four sanctions a year, with full prosecution of only two cases. Likewise, Idaho cited only 11 sanctions against 378 operations considered unsatisfactory from 1981-1984.13 While lack of funding and staff are often cited as the cause of poor enforcement programs, Oregon has imposed a Forest Products Harvest Tax which directly increases regulatory revenue with increases in timber harvests.

Instead of regulation, most states rely on policies such as financial and tax incentives to influence private forestry practices. Although these policies often promote reforestation, they generally do not have a strong effect on non-timber management issues. The main source of financial assistance is the federal government, which provides cost-share assistance to private forest land owners through the federal Forestry Incentive Program (FIP) and Agricultural Conservation Program.

Another federal financial assistance program that has led to substantial reforestation is the recently passed Conservation Reserve. It pays farmers to stop planting crops on highly erodible land for at least ten years, and return it to a soil-conserving use such as trees or grasses. Although the program has fallen short of its original tree-planting goal, it accounted for one million acres of reforestation in 1987. Most of this is taking place in the South, however, where landowners can grow commercially valuable timber species.

A few states provide their own cost-share dollars, which have become more important in recent years due to declining federal expenditures. Among these is Virginia, whose reforestation program is modeled after FIP, and Illinois, which provides financial assistance to landowners who have an approved forest-management plan. Also, California has a generous program, funded by state timber sales, which provides landowners with up to 75 percent of the funds for reforestation, wildlife habitat enhancement, and land conservation.

There are many tax breaks for owners of private forest land, mainly to address the risks of timber production's long-term

investment. Historically, the federal tax code contained a number of these, such as a ten-percent tax credit for up to $10,000 of annual reforestation expenses. However, the tax reform law of 1986 eliminated many benefits, including preferential capital gains rates.[14]

. . . more pressure will be placed on private forest lands under state jurisdiction.

State tax benefits are often in the form of lower rates on agricultural land. Wisconsin has one of the more innovative programs, which reduces property taxes if a landowner agrees to a long-term timber-management contract with the Department of Natural Resources. A few states provide tax benefits for non-timber purposes, such as New Hampshire, which lowers rates on land opened for recreation, and Indiana, which taxes land managed for wildlife at only $1 per acre. Likewise, Louisiana relieves landowners of all property taxes in exchange for a 25-year lease on the land for wildlife management.

A new and promising area in state forestry is forest-resource planning. At its best, planning can balance the management concerns of all forest users and can establish a management framework for protecting all forest resources. Most states initiated planning programs in 1978, following passage of the Cooperative Forestry Assistance Act, which provided federal funds and technical assistance for that purpose. Currently, only West Virginia does not have a planning program, and only Alaska, Arizona, Connecticut, New Mexico, and Tennessee have not completed their plans. Kentucky has completed a draft plan, but has not released it.[15]

While it is currently difficult to assess state planning efforts, key areas to consider include whether the state plan is based on a forest resource inventory, is linked to the state's budget process, provides for a high degree of public involvement, and gives equal consideration to non-timber values. Planning has led to better cooperation among user groups in some states and played a major role in the creation of two regional forestry coalitions: The Lake States Forestry Alliance (Michigan, Minnesota and Wisconsin) and The Northeastern Forest Alliance (Maine, New Hampshire, New York, and Vermont).

It appears that states will have an increasingly important role in managing our forest land. With timber harvesting on federal lands in decline, such as in the Northwest, more pressure will be placed on private forest lands under state jurisdiction. While it is difficult to protect against natural disasters, we can stop man-made disasters and destruction of forest ecosystems. But while states have authority over 73 percent of commercial forest land, few have enacted comprehensive forestry laws. The challenge for states is to move more swiftly to ensure the long-term sustainability and diversity of the forest ecosystem for its wildlife, watershed protection, recreational, and timber values.

FOREST MANAGEMENT SNAPSHOT

Washington has one of the most effective forestry programs in the nation. This assessment is based mainly on the consideration of a cooperative agreement reached in 1987 among the state's environmentalists, timber producers, state agencies, and Indian tribes. Known as the Timber, Fish and Wildlife Agreement, it may set the standard for multiple forest resource management.

The Agreement focuses on implementation of Washington's forest practice law, which has been in place since 1934 but has been highly controversial. It lengthens the time for reviewing most forest practice applications from 14 to 30 days to allow time for considering comments from all parties. It allows applicants to propose site-specific plans, which may vary from regulations if they can show that the plan will result in equal or greater resource protection. And it identifies priority areas, such as critical wildlife habitat and unstable watersheds, on which forest practices may be reviewed by an interdisciplinary team.

Currently:

- seven states have comprehensive forest management laws;
- ten states have legal regulations requiring reforestation following harvest, although 30 states use some form of tax relief or financial incentive;
- seven states have identified forest practices as a major contributor to water quality problems, and of those only two are taking aggressive action to minimize impacts.

SOLID WASTE RECYCLING

The stage is set for a fundamental rethinking of the nation's waste management policies.

Rockford, Illinois residents can win more than $1,000 just for taking out the trash. In one of the country's most innovative programs for voluntary recycling, Rockford's "trash lottery" rewards randomly selected households for separating the recyclable materials from their garbage, and pays them from the city's savings in landfill costs. In King County, Washington strong support for recycling brought a postponement of plans to incinerate waste. County officials along Puget Sound are targeting 65 percent of the waste stream for recycling by the year 2000. And in New Jersey where the landfill problem long ago reached crisis proportions, the state has required each county to recycle 25 percent of its waste within two years.[16]

As environmental pollution from landfilling and incineration of trash becomes more apparent and disposal costs soar, policy makers across the country are turning to what could become very far-reaching programs for waste reduction and recycling.

The U.S. currently produces more than 11 billion tons of nonhazardous solid waste each year. This includes industrial nonhazardous waste, oil, natural gas and mining wastes, and commercial and residential trash—also known as municipal solid waste. Industry generates the greatest portion of the waste stream—an estimated 7.6 billion tons. The industrial waste stream, which is disposed mainly on-site, has received little public scrutiny or regulation.[17]

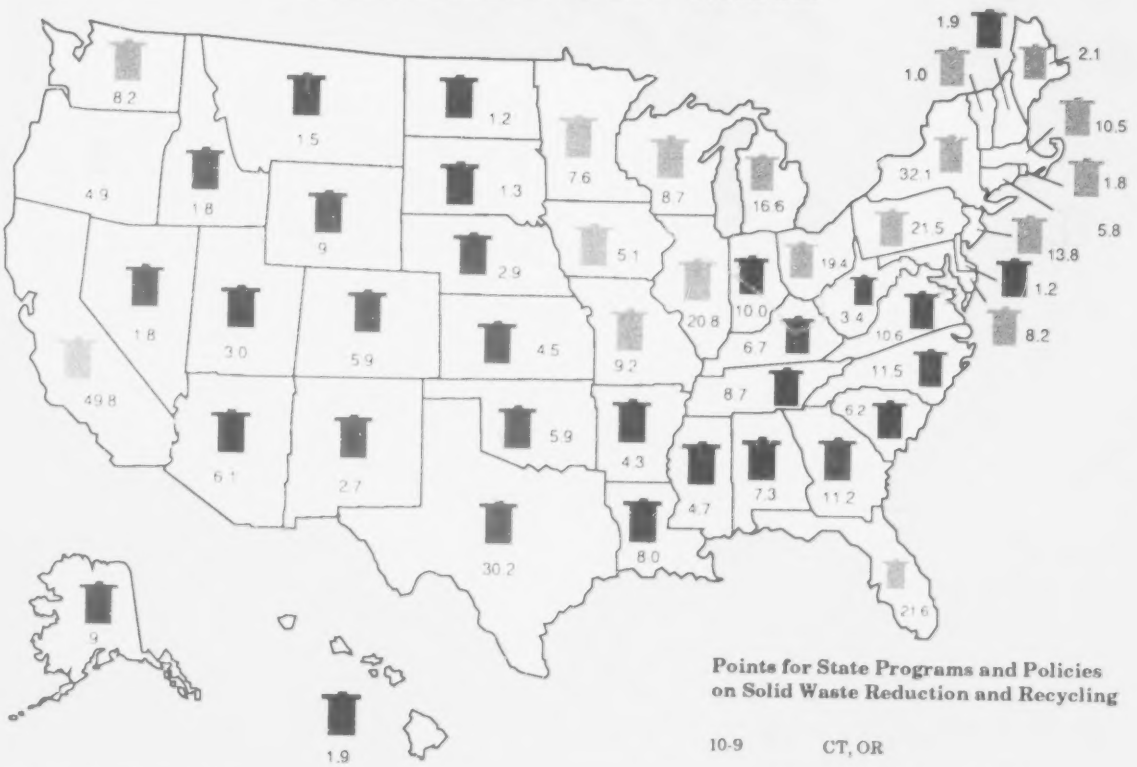
By comparison, municipal solid waste amounts to 160 million tons per year, and has traditionally been disposed of in landfills. Due to decreasing disposal capacity, soaring costs, and strong citizen opposition to new landfills and incinerators, recent state and local policy-making has focused on this waste. Currently, ten percent of municipal waste is incinerated, ten percent is recycled, and 80 percent is landfilled.[18]

The solid waste crisis has arrived at a time when the amount of municipal solid waste being generated is rapidly outstripping the growth in population. Since 1960 the tonnage of commercial and residential waste has increased 80 percent. The federal Environmental Protection Agency (EPA) expects it to increase another 20 percent by the year 2000.[19] With growing mountains of trash threatening to overwhelm land-disposal capacity, the stage is set for a fundamental rethinking of the nation's waste management policies.

Prior to 1920, 70 percent of American cities maintained source-separated recycling programs. During World War II, the federal government also rallied communities and industries to recycle and reuse up to 25 percent of the waste stream. But following the war, commitment to recycling dropped off.[20] Finally, in the mid-1960s and early 1970s widespread pollution and litter brought a resurgence of interest in recycling and waste reduction.

In 1965 Congress passed the Solid Waste Disposal Act, which supported alternatives to unregulated dumping and incineration. In 1970 the Solid Waste Disposal Act was amended by the Resource Recovery Act which directed EPA to review the potential for waste reduction and emerging waste reduction programs across the country. In 1976 the Resource Conservation and Recovery Act (RCRA) encouraged states to develop state solid waste management plans that would give priority to management approaches that conserved material and energy resources. RCRA established minimum siting and operating standards for solid waste disposal facilities and provided states with technical and financial assistance. RCRA also

RESIDENTIAL SOLID WASTE



Key to Reading the Map

Example: Oregon - Best Overall
10 Points for Programs and Policies

4.9 — 4,900 tons of residential solid waste generated daily in 1988 (based on 3.6 lbs/person/day)

Points for State Programs and Policies on Solid Waste Reduction and Recycling

10-9		CT, OR
8-7		CA, FL, IA, IL, MA, MN, NJ, NY, PA, RI, VT, WI
6-5		MD, ME, MI, MO, OH, WA
4-3		AK, CO, DE, GA, ID, KS, KY, NC, NE, NH, NM, NV, OK, TX, VA, WV, WY
2-1		AL, AR, AZ, HI, IN, LA, MS, MT, ND, SC, SD, TN, UT

Source: Renew America, 1989

established a Resource Conservation Committee to study the impact of federal policies on individual and industrial resource conservation practices.

The growing support for national legislation for recycling and waste reduction was sidetracked by the energy crisis and an interest in incinerating waste for energy and by the emergence of toxic waste dumps as a new national crisis. By 1981, EPA's solid waste grant program to states was eliminated by budget cuts and since that time, state and municipal solid waste managers have received little, if any, federal assistance. Only 18 states have current solid waste management plans or comprehensive regulations in place. Eleven additional states devised plans as directed by RCRA but have not updated them. Nine states are revising or developing current plans.

Limited landfill space and the high visibility of medical waste washing up on beaches, along with growing concern over toxic compounds from incineration plants, have once again turned public attention to solid waste management. The states as well as the federal government are assuming broader responsibilities.

Recycling and waste reduction have been recognized by many local and state officials as the core of integrated waste management. The first essential step is reduction of the volume of waste through new packaging laws and process modifications. The second step is recycling, composting, and reuse of waste material. The least preferable options, to be pursued only after waste reduction and recycling have been fully implemented, are incineration to reduce

SOLID WASTE RECYCLING MATRIX

	1 MUNICIPAL SOLID WASTE LANDFILLS	2 LANDFILL CAPACITY/ YEARS REMAINING	3 SOLID WASTE LANDFILLED/ RECYCLED/INCINERATED	4 SOLID WASTE MGMT. PLANS	5 LEGISLATION	6 RECYCLING ASSISTANCE	7 PUBLIC EDUCATION	8 RECYCLING OF USED OIL, SCRAP TIRES, IND. WASTE	9 HOUSEHOLD HAZ. WASTE	10 MARKET DEVELOPMENT	11 TASK FORCE	12 SOLID WASTE INCINERATORS	13 INCINERATION ASSISTANCE
Alabama	122	5 - 10	96/2/2	NC*				O				1 / 1	T
Alaska	179	>10	90/<1/10		P,Y				Y			2 / 0	F
Arizona	96	>10	99/1/0	NC								0 / 0	
Arkansas	84	>10	94/1/5	NC		T		I				2 / 0	T
California	400	>10	88/11/1	Y	B,P,Y*	T/F	Y	O	Y	Y		2 / 1	T
Colorado	122	5 - 10	>90/unk/<1			T/F		T				0 / 0	T
Connecticut	91	<5	95/2/4	Y	M,B,P,C,Y	T/F	Y	O T	Y	Y	Y	4 / 1	T/F
Delaware	3	>10	50/7/43		B,P	F*	Y					1 / 0	F*
Florida	126	5 - 10	65/10/25	Y	M,B,P,C,Y	T/F	Y	O T I	Y	Y		8 / 6	T/F
Georgia	198	>10	94/1/5	NC		T/F	Y	O				1 / 0	T
Hawaii	19	5 - 10	84/3/13			F		O	Y			1 / 0	F
Idaho	95	>10	96/<1/<2	NC		T	Y	I		Y		1 / 0	T
Illinois	168	5 - 10	95/ 2/ 3	R	P,C,Y*	T/F	Y	I	Y	Y		1 / 0	T
Indiana	96	5 - 10	94/5/1	NC*		F*		I				1 / 1	T/F*
Iowa	83	>10	95/3/2	R	B,P,Y*	T/F	Y	O I	Y		Y	0 / 0	T/F
Kansas	124	>10	99/1/0	NC*		T		O	Y			0 / 0	
Kentucky	107	<5	unk/unk/0	*		F*	Y			Y		0 / 0	F*
Louisiana	93	>10	90/1/9	*			Y					0 / 0	
Maine	294	5 - 10	85/5/10	*	B,P	T/F	Y	O			Y	2 / 0	T/F
Maryland	42	5 - 10	88/8/4	*	M,Y	T/F		O I				2 / 0	T/F
Massachusetts	203	<5	78/5/17	Y	B,P,Y	T/F	Y	O	Y	Y	Y	5 / 1	F
Michigan	58	5 - 10	85/7/8	Y	B,P	T/F	Y	O I	Y	Y		1 / 2	T/F
Minnesota	105	5 - 10	92/4/4	Y	P,C,Y	T/F	Y	O T I	Y	Y	Y	6 / 3	T/F
Mississippi	108	>10	unk									1 / 0	T
Missouri	106	5 - 10	unk	R	Y	F	Y	I	Y	Y		1 / 1	T/F
Montana	129	5 - 10	99/<1/<1			T				Y		1 / 0	T
Nebraska	42	<10	97/3/0	NC*		T/F				Y		0 / 0	T
Nevada	107	<10	100/0/0	NC		F	Y	O				0 /0	
New Hampshire	70	5 - 10	74/ 5/12	NC	Y	F			Y	Y	Y	3 / 0	F
New Jersey	73	<5	89/10/<1	Y	M,P,Y	T/F	Y	O		Y	Y	2 / 6	F
New Mexico	213	>10	97/3/0	Y		T						0 / 0	
New York	304	5 - 10	83/1/16	Y	M,B,P,Y*	T/F	Y	O I	Y	Y	Y	9 / 8	T/F
North Carolina	124	>10	98/<1/1	NC		T/F		I		Y		1 / 1	T/F*
North Dakota	100	>10	unk			T						0 / 0	T
Ohio	149	<5	85/2/13	*	Y	T/F	Y	O I		Y		1 / 0	
Oklahoma	123	5 - 10	unk	NC	Y*	T						2 / 0	
Oregon	127	>10	75/20/5	NC	M,B,P,C*,Y	T/F*	Y	O T		Y		1 / 0	T
Pennsylvania	135	<5	95/1/4	R	M,P,C,Y	T/F	Y	O T I	Y	Y	Y	2 / 5	T/F
Rhode Island	11	5 - 10	98/3/0	Y	M,P,Y	T/F	Y	O I	Y	Y	Y	0 / 2	T/F
South Carolina	80	>10	99/unk/1									1 / 1	T
South Dakota	55	>10	100/0/0	NC		T						0 / 0	T
Tennessee	120	>10	unk	NC		T/F*						4 / 0	T/F*
Texas	926	>10	90/ 6/ 2		Y*	T		I		Y		3 / 0	T
Utah	112	>10	unk			T						1 / 0	T
Vermont	69	5 - 10	82/12/6	Y	B,P,Y	T/F	Y	I	Y		Y	0 / 0	F
Virginia	147	<5	95/1/4	Y		T/F	Y	O				6 / 1	T/F
Washington	118	>10	90/5>10/ 1	Y	M,Y	T/F	Y	O T			Y	1 / 1	F
West Virginia	141	<5	>99/<1/<1			F	Y					0 / 0	F*
Wisconsin	933	>10	23*/74*/3*	Y	M,P,C,Y	T/F	Y	O T I	Y	Y		1 / 0	T/F
Wyoming	78	>10	97/3/0			T/F		O				0 / 0	T

volume and extract energy, and finally landfill disposal.

Recycling and waste reduction have been recognized by many local and state officials as the core of integrated waste management.

Some analysts claim that the municipal solid waste stream can be reduced by 20 percent by combining packaging design and process modifications that favor reusable and durable containers, and by generally advocating reduced consumption.[21] "Waste reduction" means eliminating waste at its source and packaging is one of the best targets. One-third of the waste stream is comprised of packaging and containers. Paper and paperboard are the principal packaging materials, followed by glass and plastics. Plastics are rapidly replacing glass and the plastics industry estimates that use of plastics, principally for packaging, will increase 36 percent by the year 2000.

Waste reduction activity in the states is currently focusing on reducing or banning certain types of packaging materials, and requiring plastics used for containers to be biodegradable or photodegradable. Packaging and container legislation accounted for an estimated 300 bills introduced in more than 35 state legislatures in 1988. Sixteen states passed legislation that bans the use of non-biodegradable six-pack plastic beverage rings. Four states—Florida, Massachusetts, Michigan and Minnesota—have instituted new disposable packaging taxes.

At least eight states have established source reduction or packaging task forces. Rhode Island requires any business with more than 100 employees to file a waste audit. Other states are pursuing waste reduction education programs and are providing waste reduction grants.

At the federal level, legislation has been proposed that would require the Department of Commerce and the EPA to issue regulations on many consumer products and packaging to require certain products to be either recyclable or degradable. EPA's Municipal Solid Waste Task Force is calling on manufacturing and design industries to take a leadership role in designing packaging and containers.

While the U.S. as a whole recycles only 10 percent of the 160-million-ton annual municipal solid waste stream, some analysts argue that rates of 70-80 percent can be achieved.[22] Materials as diverse as aluminum, paper, glass, plastics, yard waste, and rubber are ripe for recycling. These materials can be separated from the waste stream and reprocessed into useful raw materials for products.

Much of the municipal waste stream can be composted — the process of aerobic, biological decomposition of organic waste. Approximately 70 percent of municipal solid waste is considered organic: 18-20 percent organic yard waste, 8-17 percent food waste, 4-8 percent wood, and 35-40 percent paper and paper-

MATRIX KEY

1. Number of Operating Municipal Solid Waste Landfills.

2. Years of Remaining Municipal Landfill Capacity (Estimated statewide average).

3. Percentage of Municipal Solid Waste Currently Landfilled/ Recycled/Incinerated:
unk = unknown; *= includes agricultural, sewage sludge and other waste streams in calculations.

4. State Solid Waste Management Plans: Y = State has current management plan; NC = State plan is not current; R= No formal plan but regulations that act as a plan; *= draft plan underway.

5. Legislation: M = mandatory recycling; B = beverage container deposit or recycling legislation; P = packaging restrictions (nondegradable plastic bans, product labeling requirements); C= landfill bans or recycling requirements for leaves and/or yard waste (C*=Portland metro area only); Y= procurement legislation for recyclables (Y*= targets paper products only).

6. Recycling: T = technical assistance; F = financial assistance; F *= tax credit only.

7. Public Education and Promotion of Recycling: Y=state program.

8. Used Oil, Scrap Tires and Industrial Waste: O = encourages used oil recycling; T= encourages scrap tire recycling; I= promotes recycling and reduction of industrial nonhazardous waste.

9. Household Hazardous Waste Collection; Y= has provided state funding.

10. Market Development Assistance Programs: Y= yes.

11. Have Source Reduction or Packaging Task Forces:
(includes states participating in the Coalition of Northeastern Governors, CONEG).

12. Number of Municipal Solid Waste Mass Burn Incinerators Operating or in Startup/ Number Under Construction, Permitting, or Financing.

13. Incineration: T = Technical Assistance for incineration; F = financial incentives for incineration;
F * = tax credit only.

For sources, see page 45.

board. Individuals, commercial businesses, and industry all produce "wastes" that are recyclable or reusable.[23]

A few municipalities have moved forward quickly on the recycling front. On opposite coasts, Woodbury, New Jersey and Davis, California currently recycle more than 30 percent of their waste tonnage, while many other cities have reached a 20 percent recycling mark.

Long-term success of recycling relies on the ability to create and sustain a market for materials.

Among policy makers there is significant debate whether recycling should be mandatory or voluntary. Mandating source-separation by household or generator has been shown to be the more effective action, with program participation ranging up to 90 percent. Even in well-run voluntary programs, 50 percent participation is unusual. According to state recycling officials, public education and promotion are key factors in determining participation rates. In addition to education, a major issue for individuals is convenience. According to public opinion polls conducted between 1972 and 1987, greater than 90 percent of those surveyed favor recycling if it is made convenient.[24] Curbside collection is the preferred method for convenience, and there is evidence that participation is higher when recyclables are picked up the same day as regular garbage collection, and when residents are provided with special containers in which to separate and store recyclables.

Although ten states have enacted mandatory recycling legislation, only eight are implementing or developing comprehensive recycling programs: Connecticut, Florida, Maryland, New Jersey, New York, Oregon, Pennsylvania, and Rhode Island.

New Jersey's Mandatory Source Separation and Recycling Act of 1987 requires each county to achieve at least 25 percent recycling within two years. Each county must hire a district recycling coordinator and target yard waste such as leaves, as well as at least three other materials to be source separated. Counties must also determine the methods of collection, marketing, and sale of recyclables once collected. Municipalities are responsible for passing the mandatory ordinances that will require citizens to participate. The program is funded by a surcharge on waste disposal at landfills or incinerators, plus an $8 million dollar appropriation in 1987. The majority of the funds are given out directly to municipalities in the form of tonnage grants where the size of the grant is linked to the number of tons recycled by each city. The law is enforced with penalties ranging from fines to refusal to pick up an individual violator's trash.

Long-term success of recycling relies on the ability to create and sustain a market for materials. States can play a signficant role both as consumers of recycled materials and by providing legislative and economic incentives to spur market creation.

Twenty-two states have passed legislation requiring state agencies to favor recycled materials in their purchasing policies. Six states specify purchase preference for recycled paper products only.

Although nearly half the states, as well as the federal government, have passed procurement legislation since the early 1970s, relatively few recycled products have been purchased. The renewed emphasis on recycling and development of new uniform purchasing standards for paper products by government officials may help overcome this sluggishness. Twenty-two states now have one or more market development-assistance programs that should spur further development of the recycled materials industry. Market development assistance programs include tax incentives, financial and technical assistance, actions to stabilize supply and demand of recyclable materials, actions to attract recycling businesses, consumer education, and the removal of regulatory barriers.

One innovative effort in support of recycling businesses uses a concept borrowed from energy conservation—shared savings. A city that source separates its paper and avoids a cost of $60 per ton to dump it in a landfill can pay $40 per ton to the recycling business to help support its costs, and still save $20. Chicago, Newark and Grand Rapids have developed such programs.[25]

The environmental benefits, although not quantified in current costs, must ultimately be seen in terms of savings. Substituting recycled paper resources for virgin paper, for example, consumes significantly less energy and results in 74 percent less air pollution and 35 percent less water pollution for the same amount of paper.[26] More support for research and development is needed to expand the variety and quality of recycled products.

One-third of the waste stream is comprised of packaging and containers.

Recycling can also be viewed in broader economic terms. Recycling activities can help revitalize depressed local economies, creating 36 jobs for every 10,000 tons of material recycled, versus 6-10 jobs for every 10,000 tons of material

landfilled or incinerated.

State policy makers are excited by the possibilities. New York has set the highest statewide goal to date, targeting 50 percent of the waste stream for reduction and recycling by 1997. Florida's new solid waste law sets a statewide goal of 30 percent reduction by 1994 with an interim goal of 50 percent container recycling by 1992. A growing number of states are incorporating the concept of a waste management hierarchy based on waste reduction and recycling into their solid waste plans, though no state has yet tied funding of programs to the hierarchy. Despite all the excitement and good news, more than half the states currently recycle less than five percent of their waste streams.

The haphazard solid waste management that generally occurs in the U.S. is supported by old habits, economic inertia, and an established industrial infrastructure that perceives threats to its investments. The hotly contested ballot issues over deposit legislation—or "bottle bills"—that support recycling through deposits, return, and reuse of bottles and beverage containers have shown the bottling industry adamantly opposed to recycling proposals. Beverage container deposit or recycling laws have been proposed in almost every state, but have been enacted in only 11 states. In 1987 the bottling industry spent $2.3 million in a campaign to convince Washington, D.C. voters to defeat a proposed bottle-deposit law.[27]

An intense conflict has likewise emerged over the use of waste-incineration plants. A number of states are promoting incineration as their primary waste management process, regarding waste reduction and recycling as only marginal programs. The competition between recycling and incineration is very specific—the elements with the best heat value for waste-to-energy plants are paper or organic materials that could be recycled. There is also competition for scarce state funding. Thirty-five states currently have at least one municipal solid waste incinerator in operation and 26 states provide tax credits, zero- or low-interest loans, or other types of financing assistance for incineration facilities. This funding is far greater than that committed to waste reduction or recycling.

The problems of solid waste management will continue to mount as the waste stream expands. Without successful waste reduction and recycling programs local governments face the prospect of escalating disposal costs, growing shortages of disposal capacity, endless conflicts over siting of landfills and incinerators, and high cleanup costs of environmental contamination. Management of the waste stream has grown from a local issue to a regional, statewide, and even interstate problem. To successfully manage our waste stream, the federal government and the states must make a long-term commitment to reduce the growing volume of waste and make recycling succeed.

SOLID WASTE RECYCLING SNAPSHOT

Recycling and waste reduction are the centerpiece of new integrated waste management. Development of programs is at an early stage and policies in the states reflect many variations and levels of commitment. There are three key areas of concern: how comprehensive the laws are concerning the diversity of materials; whether programs are voluntary or mandatory; and whether incentives for incineration facilities are undermining recycling efforts.

In addition to Oregon, seven states are implementing comprehensive recycling programs: Connecticut, Florida, Maryland, New Jersey, New York, Pennsylvania, and Rhode Island. All but Oregon strongly support incineration which competes with recycling for limited state funding and for materials in the waste stream.

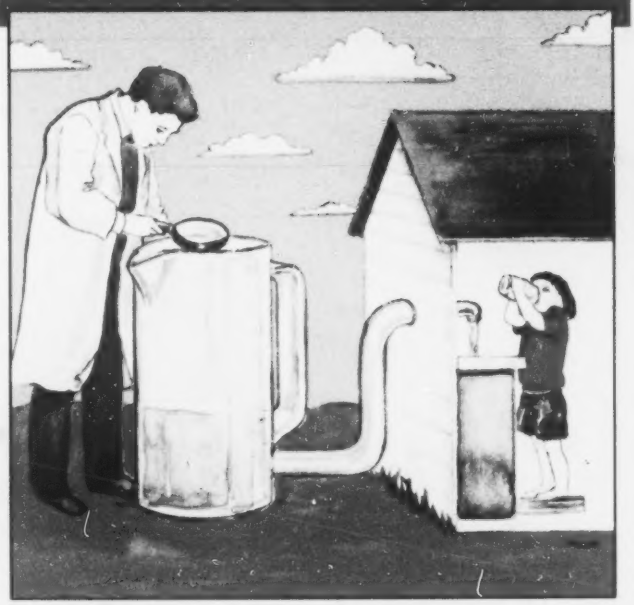
Oregon is widely recognized for its leadership in recycling. Oregon's Opportunity to Recycle Act requires communities to provide drop-off centers or curbside programs, though it does not require individuals to recycle. The state focuses on market development and encourages recycling and procurement of recycled products through its comprehensive tax credit policies. The state gave a tax credit to the one operating incinerator in Marion County, but since 1987 has declared waste-to-energy facilities ineligible for state tax credits.

Currently:

- **24 states have initiated used oil recycling programs, though few states are fully implementing them;**
- **only eight states have initiated efforts to recycle scrap tires;**
- **18 states have or participate in an industrial nonhazardous waste exchange or other program targeted at recycling industrial solid waste;**
- **seven states promote composting by banning landfill disposal or requiring the recycling of leaf /yard waste;**
- **eight states require labeling of products made with recyclable/ degradable material.**

DRINKING WATER

The rising costs of protecting water quality are leading to a crisis.



Between 1971 and 1985, 111,228 cases of disease from drinking water were reported in the United States, representing more outbreaks than in any 15 year period since 1920. During the same period traces of about 2,100 different chemical contaminants were discovered in public water systems—an ever-lengthening list of industrial and agricultural chemicals in use. The contamination and illnesses have occurred in virtually every region of the country.[28]

In 1984, residents of a Massachusetts community who had been exposed to drinking water contaminated with industrial chemicals were found to have an increased incidence of leukemia. The following year, the State of California confirmed an unusually high number of miscarriages and birth defects in a community whose drinking water supply had been contaminated when a common industrial chemical leaked from an underground tank. In McKeesport, Pennsylvania an antiquated drinking water system was found in 1983 to be responsible for an outbreak of 349 cases of giardiasis, from an amoeba that causes great intestinal discomfort. In that year alone, 40 outbreaks of waterborne bacteria and viruses caused illness in 21,000 people nationwide.[29]

Tragically, at the same time an increase in drinking water contamination has been reported, enforcement efforts by states have remained limited. In 1987, 19 states took no formal enforcement action against violators of the federal Safe Drinking Water Act's (SDWA) public health standards or testing and reporting requirements, despite more than 100,000 violations by public water systems affecting 41 million Americans.[30]

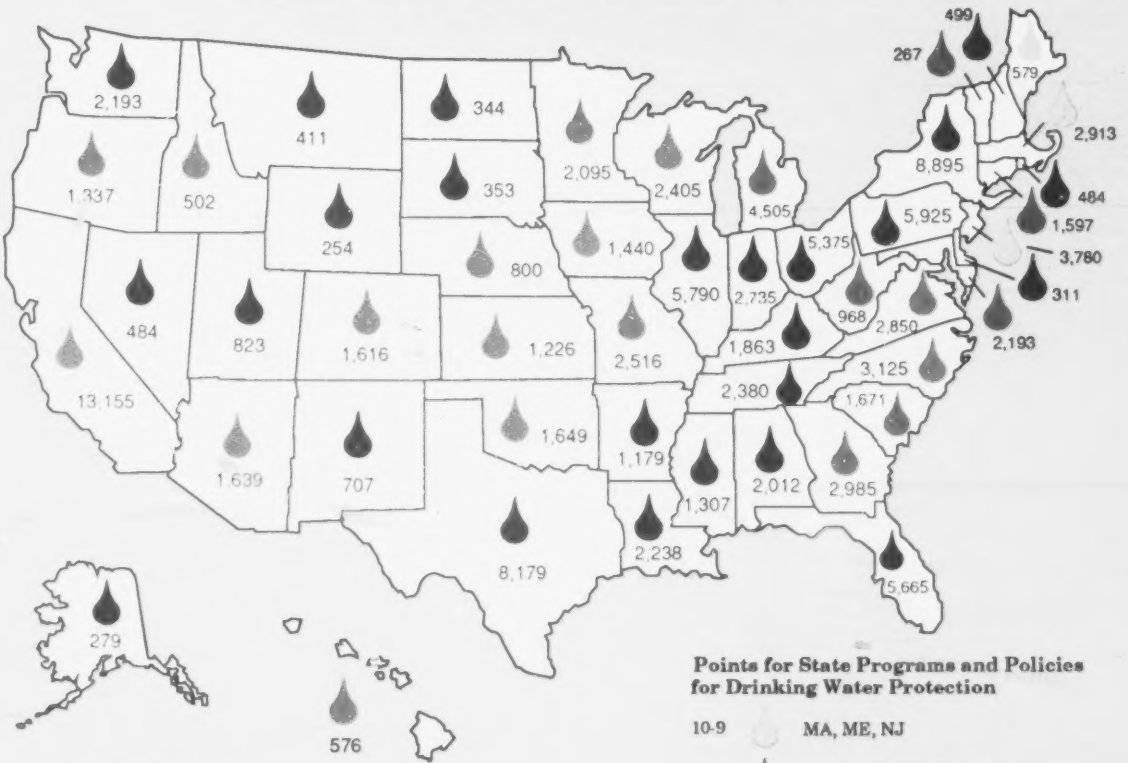
While system violations need to be addressed, many states have moved ahead to protect surface and groundwater supplies at their source. Some have developed strong groundwater protection programs—Arizona, California, Florida, Iowa, New York, and Wisconsin, for example. Twenty-five states have developed numerical groundwater quality standards. And many states are strengthening programs to control pollution from particular sources, including underground storage tanks, pesticides, waste disposal, and waste discharges and runoff into surface waters. Still others, including Nebraska and New Mexico, and cities such as Los Angeles and Boston, emphasize water supply planning as an aspect of drinking water protection.

But new federal regulatory requirements along with declining federal funding are increasing the pressure on already hard-pressed state water-quality programs as well as on public water supply systems. A recent EPA study projects a funding shortfall that will deepen each year. By the mid-1990s states will need more than $300 million annually in additional revenue in order to maintain their current programs and meet new requirements set by Congress in recent amendments to the Safe Drinking Water Act and the Clean Water Act.[31] In 1987, state drinking water program budgets nationwide totaled only $75 million.

In 1987, 19 states took no formal enforcement action against violators.

The rising costs of protecting water quality are leading to a crisis. One EPA official has noted that while the problem is urgent, states don't seem to realize what's going to hit them when the money runs out.

DRINKING WATER CONSUMPTION



Key to Reading the Map

Example: Maine - Best Overall
10 Points for Programs and Policies

579 — 579,000 gallons of drinking water consumed daily

Points for State Programs and Policies for Drinking Water Protection

10-9	MA, ME, NJ
8-7	CA, IA, NC, VA, WI
6-5	AZ, CO, CT, GA, HI, ID, KS, MD, MI, MN, MO, NE, OK, OR, SC, VT, WV
4-3	AK, DE, FL, IL, MS, MT, ND, NH, NY, PA, RI, TX, WA, WY
2-1	AL, AR, IN, KY, LA, NM, NV, OH, SD, TN, UT

Source: Renew America, 1989

Americans consume an estimated 119 million gallons of drinking water each day. Half of the U.S. drinking water supply comes from surface waters (lakes and rivers) and half from groundwater (underground aquifers). Eighty-nine percent of the population get their drinking water from the approximately 200,000 "public" water supply systems (which may be either publicly or privately owned), while 11 percent, mainly in rural areas, are served by private wells.

Historically, polluted drinking water was associated with large-scale outbreaks of disease. In New York City, for example, 20,000 people were sickened with cholera in 1908, and more than 500 died annually from water-borne typhoid. When water systems across the United States introduced chlorine treatment into public water during the early years of this century, the incidence of typhoid, cholera, and dysentery from drinking water was dramatically reduced.

During the 1920s the U.S. Public Health Service codified early standards for contaminants in drinking water. Thereafter, water treatment and distribution grew in size but changed little in nature until the early 1970s, when findings of toxic chemicals in drinking water supplies turned public concern from fear of cholera to fear of cancer.

Tests between 1969 and 1972 revealed that New Orleans' public water supply, taken from the Mississippi River, contained 66 different organic chemicals. Tests in Boston, St. Louis, Los Angeles, and other metropolitan areas confirmed that decades of using "dilution as the solution to pollution" via the nation's waterways

DRINKING WATER MATRIX

	CONSUMPTION	PUBLIC WATER SYSTEMS	COMMUNITY WATER SYSTEMS	POPULATION AFFECTED BY SDWA VIOLATIONS	TOTAL VIOLATIONS/ SIGNIFICANT NON-COMPLIANCE	GROUNDWATER PROTECTION	SURFACE WATER PROTECTION	DRINKING WATER BUDGET	WATER CONSERVATION
	1	2	3	4	5	6	7	8	9
Alabama	2,013	1,049	58 (64) /129(26) / 479(10)	712,764 / 20	374(0) / 1 (0)	-	1,2,3 / D	690.90	-
Alaska	279	1,550	3(*) /20(*) / 478(*)	251,849 / 95	6232(0) / 357(0)	A	0 / E	1,075.60	-
Arizona	1,640	1,571	31(82) / 44(8) / 701(10)	2,027,852 / 69	4472(1.25)/ 189(2)	A,B,C,D	0 / D	375.00	P
Arkansas	1,179	2,384	32(51) / 82(23) / 361(26)	137,487 / 8	186(0) / 0(0)	-	1,2,3,4 / D	756.30	-
California	13,155	9,704	370(79) / 18(7) / 3108(5)	1,258,769 / 5	2135(5.48) /88(0)	A,B,D	1,2 / C	9,400.00	P
Colorado	1,616	1,708	6(82) / 50(9) / 655(9)	74,595 / 5	658 (0)/15(10)	A,D	1,4 / D	555.00	-
Connecticut	1,598	4,395	38(*) / 21(*) / 597(*)	464,513 / 17	137(8.03)/8(0)	A,C,D	1,3,4 / A	1,215.50	-
Delaware	311	637	6(78) / 11(14) / 206(17)	40,171 / 10	124 (2.42)/2(0)	A,B	1 / B	631.70	-
Florida	5,665	4,722	182(78) / 159(8) / 1616(14)	1,946,210 / 22	4373(0.09)/ 93(0)	A,B,D	0 / B	2,793.90	-
Georgia	2,985	2,800	59(4) / 81(5) / 1381(91)	233,088 / 58	1615 (0.06)/10(0)	A	1,2,3,4 / B	2,400.00	P
Hawaii	577	161	14(86) / 14(7) / 100(7)	67,798 / 6	163(0)/2(0)	B,C,D	1,2,3 / C	918.00	-
Idaho	502	2,588	12 (*) / 28 (*) / 770 (*)	169,582 / 33	1835 (0)/16(9)	A	0 / B	613.70	-
Illinois	5,790	8,965	181(*) / 211(*) / 1560(*)	1,025,459 / 11	1211(0.17)/65(0)	A,B,C	1,2 / B	2,900.00	-
Indiana	2,735	3,765	NA	123,927 / 3	233(3.86)/13(NA)	A,B	1,2 / D	512.40	-
Iowa	1,441	2,172	NA	459,405 / 24	917(13.85)/38(4)	B,C,D	1,2,3,4 / B	740.00	-
Kansas	1,227	1,206	33(*) / 46(*) / 828(*)	313,248 / 16	542(4.06)/15(2)	D	1,2,4 / B	620.00	-
Kentucky	1,863	996	54(67) / 123(21) / 381(12)	465,697 / 18	1011(0)/6(0)	B	1,2,3 / C	1,608.00	-
Louisiana	2,238	2,573	61(75) /107 (10) /1305 (15)	407,386 / 11	446(0) / 5(0)	A,B	4 / D	2,063.10	-
Maine	579	3,164	4(61) / 8(19) / 87(20)	14,339 / 2	86(40.7)/0(0)	A,B,C,D	0 / C	597.50	-
Maryland	2,194	4,584	26(90) / 37(5) / 491(5)	195,871 / 6	135(1.48)/ 5(1)	A,C	1,3 / A	734.60	P
Massachusetts	2,913	2,048	139 (*) / 91 (*) / 346 (*)	1,218,500 / 23	178(1.12)/4(3)	A	0 / C	3,174.00	P
Michigan	4,505	13,275	*(79) / *(11) / *(10)	117,153 / 2	711(0) / 4(2)	A	1,2,3 / C	1,497.60	-
Minnesota	2,095	11,960	62(71) / 71(12) / 867(17)	555,445 / 21	175(0) / 0(0)	A,B,C,D	1,2,3 / B	1,380.00	-
Mississippi	1,308	2,046	9 (*) / 24 (*) / * (*)	624,917 / 28	1239 (0)/3(3)	D	1,2,3 / D	650.00	-
Missouri	2,517	3,017	44(70) / 87(13) / 954(17)	307,115 / 8	534(0) / 12(1)	A	1,2,3,4 / C	1,734.50	-
Montana	412	2,303	3 (*) / 24(*) / 475(*)	129,451 / 31	2517(0) / 10(1)	A,B	1,2,4 / B	500.90	-
Nebraska	801	1,501	19(63) / 27(12) / 630(25)	23,643 / 2	428(0) / 9(0)	A,B,D	1,2,3,4 / C	400.30	-
Nevada	484	739	10(75) / 13(15) / 312(10)	59,040 / 9	431(0.46)/93(0)	-	1,2,3,4 / D	587.00	-
New Hampshire	499	1,596	11(55) / 25(20) / 465(22)	84,669 / 13	197(0)/ 4(0)	A,B	4 / C	650.00	-
New Jersey	3,781	5,070	135(88) / 92(8) / 408(4)	10,731,644/100	14247(3.45) / 4(4)	A,B	1,2,3 / B	3,700.00	-
New Mexico	707	1,343	20(70) / 29(14) / 586(16)	112,660 / 15	605(0.33)/19(0)	A,B	4 / D	456.80	-
New York	8,895	11,617	153(87) / 99(4) / 3111(9)	1,096,115 / 7	1741(0.06)/16(0)	A,D	1,2,4 / C	2,167.00	P
North Carolina	3,125	10,942	61(20) / 146(7) / 2722(63)	560,317 / 16	4357(27) / 30(0)	A,B	1,2,3 / B	2,599.00	-
North Dakota	344	751	10(53) / 12(14) / 340(33)	140,060 / 29	319(1.57)/12(0)	B,D	1,4 / D	471.80	-
Ohio	5,375	10,295	130(81) /152(10) /1348(8)	442,763 / 6	2198 (0)/6(0)	A	1,2,3 / B	2,724.40	-
Oklahoma	1,650	2,599	38(60) / 76(15) / 1218(24)	540,970 / 19	969(4.54)/29(3)	A	4 / C	1,171.50	-
Oregon	1,338	2,933	*(67) / *(15) / *(18)	263,919 / 21	3623(0)/ 26(3)	A,B	1,2,3 / B	1,100.00	-
Pennsylvania	5,925	10,461	136(77)/185(11)/2143(20)	1,980,083 / 33	8856(0.65)/68(11)	-	1,2 / B	4,500.00	-
Rhode Island	484	637	*(92) / *(6) / *(2)	76,375 / 9	12 (0)/ 1(0)	C,D	1,2,3 /, C	446.00	-
South Carolina	1,672	2,218	54(66) / 86(17) / 1837(17)	233,175 / 9	266 (1.13)/13(0)	A,D	1,2,3 / D	1,918.90	-
South Dakota	353	894	11(50) / 18(13) / 407(36)	143 ,100 / 26	393(0)/16(0)	A,B	4 / B	412.00	-
Tennessee	2,380	1,537	75(73) / 122(17) / 354(10	225,562 / 9	1618(0.37) / 3(2)	-	1,3 / D	1,088.00	-
Texas	8,179	7,640	199(73)/403(13) /4070(14)	1,929,148 / 13	3397(8.95) / 126(2)	B	4 / E	4,131.60	-
Utah	823	934	39(86) / 39(7) / 335(7)	120,696 / 11	518(0) / 3(0)	B	1,2,3,4 / B	1,114.30	-
Vermont	268	2,045	5(34) / 23(31) / 436(35)	40,251 / 12	283(2.12) / 15(0)	A,B,C	1,3,4 / B	587.90	-
Virginia	2,850	4,768	67(84) / 64(7) / 1437(9)	428,935 / 11	2578 (2.52) / 18(2)	A,B,C	1,2 / A	1,980.00	-
Washington	2,193	4,620	43(71) / 64(10) / 1999(19)	2,017,830 / 58	9668(0) / 440(11)	A,B,C,D	1,3 / C	2,180.00	-
West Virginia	968	2,812	*(48) / *(23) / *(29)	118,727 / 9	369(1.63)/20(11)	A	1,2,3,4 / D	389.20	-
Wisconsin	2,405	15,325	*(70) / *(14) / *(4+)	406,838 / 13	583(1.37) / 26(1)	A,B,C,D	1,2,3 / A	1,564.10	-
Wyoming	255	826	8 (*) / 17 (*) / 300 (*)	91,437 / 43	1361(1.03)/ 9(NA)	A	1,2 / B	NA	-

had resulted in widespread contamination of drinking water.[32]

Public pressure forced Congress to pass the Safe Drinking Water Act in 1974. The law required EPA to set and enforce national standards for drinking water quality, develop guidelines for treatment of drinking water, set monitoring and reporting requirements for public water systems, and regulate underground injection of wastes.

The SDWA applies to all public water systems, which are divided into two basic categories: community and noncommunity systems. Community systems serve more than 15 connections year-round, or at least 25 year-round residents. In 1987 there were about 60,000 community systems in the United States. Noncommunity systems provide drinking water to travelers or intermittent users. Roughly 140,000 noncommunity systems in hotels, restaurants, campgrounds, service stations or other areas of short-term use serve people on the go. The law leaves private wells unregulated.

Although on average half of U.S. drinking water comes from surface water and half from groundwater sources, rural areas receive about 90 percent of their drinking water from groundwater, and urban areas are largely supplied by surface water.

There is no comprehensive federal law designed to protect groundwater.

Surface water protection was strengthened in 1972 with the Clean Water Act, a measure that extended federal jurisdiction to all surface waters in the United States and directed EPA to regulate the amount and types of municipal and industrial discharges into rivers, lakes, and streams. The federal Water Quality Act of 1987, which amended and further strengthened the Clean Water Act, gives substantial responsibility to the states for controlling discharges of toxic substances and for enforcement against persistent polluters. It also authorizes $400 million for a new federal-state program to control non-point source pollution. States developed assessments of their non-point source problems during 1988, as part of a multi-year plan to control polluted runoff from city streets, construction sites, farms, mining operations, and other sources.

In contrast with surface water, there is no comprehensive federal law designed to protect groundwater and no single federal agency oversees groundwater programs. A patchwork of provisions in 16 separate federal statutes grants jurisdiction in an uncoordinated fashion to numerous federal agencies and provides authority for protecting groundwater from some of the main potential pollution sources. Many states have adopted two new groundwater protection programs established by the 1986 SDWA amendments—the Wellhead Protection Program and the Sole-Source Aquifer Demonstration Program.

Two key components of comprehensive groundwater protection programs are source control regulation to prevent leaching by potential pollution sources, and the use of water quality standards as an enforcement tool. Between 1985 and 1987, 28 states passed laws to control leaks from underground storage tanks, in conformity with a new federal regulatory program. Thirteen states enacted laws pertaining to statewide groundwater protection strategies, groundwater classification, or

MATRIX KEY

1. Consumption: Number of gallons (in thousands) of drinking water consumed.

2. Public Water Systems: Number of public water systems in each state.

3. Community Systems by Size: Number of large, medium, and small community water systems. Percent of population served by each shown in parentheses. (Large = 10,000 + people served year-round; medium = 3,301 - 10,000; small = 25 - 3,300). NA,*= data not available.

4. Population/Percent of State Population Affected by Safe Drinking Water Act (SDWA) Violations: Number of people affected by community system violations in FY 1987. Percent of state population affected also includes noncommunity water system violations.

5. Total Violations/ Significant Non-Compliance: Total number of SDWA violations in FY1987 (percent state enforcement action)/ Total number of systems in Significant Non-Compliance with the SDWA in FY1987 (Number of state enforcement actions against SNCs).

6. Groundwater Protections: A= has narrative and/or numeric groundwater standards. Laws passed in 1985–87; B= underground storage tank control; C= statewide strategies, groundwater classification, or groundwater cleanup fund; D= land-use management or control of agricultural chemicals.

7. Surface Water Protections: EPA approval of State programs: 1= NPDES permits; 2= state regulation of federal facilities; 3= pretreatment program; 4= construction grant programs; 0= no provisions. /Programs to control nonpoint source pollution of surface water: A= most comprehensive, E= least comprehensive.

8. State Drinking Water Budget: Program budgets (in thousands), FY1988, including federal funding to state programs. (Indiana = FY89 data).

9. Water Conservation: Statewide programs, excluding agricultural water use.

For sources, see page 46.

dedicated funds for groundwater cleanup. Arizona's 1986 Environmental Quality Act incorporates a range of regulatory and nonregulatory components into a comprehensive groundwater protection strategy.33

Eighteen states have passed laws designed to keep agricultural chemicals out of groundwater. California and Arizona require the submission of data on a pesticide's potential to leach into groundwater, the adoption of numeric water-quality standards, and strict regulation and possible cancellation of the registration of pesticides that are detected in an aquifer. Iowa took a comprehensive but essentially nonregulatory approach with a program of education, research and demonstration projects designed to address groundwater pollution from a range of sources. The $65 million Iowa program is funded in part with fees on pesticides and nitrogen fertilizers. Six states passed laws to regulate chemigation, the practice of applying agricultural chemicals through irrigation systems.34

While the federal government sets drinking water standards that apply to all public water systems, federal law does not require the adoption of ambient water quality standards for groundwater. Twenty-five states have, on their own, developed numerical groundwater quality standards that set upper limits of allowable concentrations of various contaminants. Some states use narrative groundwater-quality standards without specific numerical values. As one component of a comprehensive approach, standards can be used as a trigger for regulatory enforcement action to control pollution sources and prevent human exposure to contaminated groundwater. However, standards alone do not serve to prevent contamination. Once a standard has been violated it is too late to prevent contamination.

States have a major responsibility for assuring the safety of public water supplies. Between 1974 and 1986, 48 states—all but Indiana and Wyoming—assumed "primacy" in enforcing federal drinking water requirements. These states developed a program of standard-setting, oversight of public water supply systems, monitoring, inspections, and emergency response that is at least as stringent as EPA's. EPA must approve each state's drinking water program before granting it primacy, and retains oversight authority.

EPA's enforcement data indicate that public water systems frequently violate drinking water quality standards as well as monitoring and reporting requirements. In 1987, 36,763 public water systems nationwide, including 16,250 community systems, were in violation. Forty-one million Americans get their drinking water from these systems.35

EPA has set no standards for the vast majority of potential drinking water contaminants.

But formal enforcement action against violators by EPA and the states is rare. EPA defines formal enforcement action to include, for example, compliance orders, administrative penalties, consent decrees, injunctions, show cause hearings, and civil and criminal proceedings. States took such action in only 2,544, or 2.5 percent, of these cases. Only six states—California, Connecticut, Iowa, Maine, North Carolina, and Texas—enforced in more than five percent of such cases.36

Given the shortage of resources to deal with the overwhelming number of Safe Drinking Water Act violations, EPA and state enforcement efforts target mainly those systems with the most serious and persistent violations. But even with these 2,097 significant noncomplier systems (SNCs), states took formal enforcement action against only 81, or 4.1 percent, in the 12-month period ending in March 1988. Only seven states—Colorado, Idaho, Massachusetts, Michigan, Mississippi, New Jersey, and West Virginia — took action against 50 percent or more of their SNCs. Twenty-eight states took no enforcement action. Arkansas, Maine, and Minnesota reported they had no systems in significant noncompliance.37

Administrative steps to bring systems into compliance include notification letters, site visits, compliance meetings, reminder letters, technical assistance, and other corrective activities. Many states also have programs for training and certification of system operators, grant assistance to systems, and other preventive activities. Drinking water prevention and corrective activities and enforcement rely on adequate funding. State budget amounts vary widely, from $460 per system to more than $7,000.

Aside from the activities of the states, the entire enforcement process is seriously weakened by the lack of standards and testing for many contaminants. By 1987 EPA had set standards—known as primary drinking water standards, or maximum concentration levels —specifying the maximum allowable levels of contamination to protect public health, for only 30 substances. EPA has set no standards for the vast majority of potential drinking water contaminants with known or suspected adverse health effects, and few public water systems are tested for the presence of unregulated chemical pollutants.38

With the 1986 amendments to the Safe Drinking Water Act, Congress required EPA to establish primary drinking water standards for an additional 53 contaminants by June 1989. In addition, every three years EPA must develop a list of 25 new

contaminants for possible regulation. The amendments also require states or systems to monitor for a large number of unregulated contaminants. All community systems will have to monitor at least once every five years for a list of substances developed by EPA that are known or suspected to occur in drinking water. The cost of monitoring for a large number of organic chemicals is high.

The lengthening list of regulated contaminants along with stricter, more frequent testing requirements threaten to swamp state drinking water programs. One harried state official says there is little enforcement now because states don't have the money or the people, and that new standards aren't likely to be enforced either.

For small water systems—those serving from a few hundred to a few thousand people—the cost of compliance with the 1986 SDWA amendments may be out of reach. Small systems are often staffed by volunteer operators who do not attend state-sponsored certification programs. According to EPA many small systems operate on annual budgets of less than $5,000. Rural communities, hard-hit by farm foreclosures and Main Street bankruptcies, claim they cannot afford to raise water rates to cover new monitoring and compliance standards.

While the projected annual shortfall in funding needed by states and public water systems in the coming years to implement requirements set by Congress amounts to just a fraction of the cost of a single centralized facility such as a nuclear power plant, or of the $5-6 billion cost of the proposed superconducting supercollider, it appears unlikely that additional federal funds will be forthcoming. Instead, EPA will likely recommend that states pursue "alternative funding mechanisms" to pay for upgrading their drinking water enforcement programs. Alternative funding mechanisms might include reorganizing smaller public water systems into regional water utility districts that would have easier access to low-interest loans from state revolving loan funds, state bond pools, and state-funded bond insurance.

Several states, and municipalities such as Los Angeles, have already instituted such programs. Pennsylvania provides an integrated funding program with an array of options for small-system loans.

Ultimately it is all of us who drink water who will bear the costs of our drinking water supply, whether it is the rising cost of providing safe drinking water or the even greater costs of health risks. But a significant portion of the economic burden must be shifted to polluters. Without adequate enforcement of standards and controls on pollution sources, degradation of our water supplies and an increase in illnesses will continue. Responsibility for enforcement rests with the states. Those with little protection for drinking water must make a significant investment in safeguarding this priceless resource.

DRINKING WATER SNAPSHOT

Maine has the best program overall for drinking water protection, monitoring, and enforcement. With a small staff and a moderate budget, it controls violations and maintains monitoring schedules through clever computer tracking and old-fashioned human vigilance. Maine allowed no community system to fall into significant noncompliance with Safe Drinking Water Act (SDWA) requirements. And noncommunity water systems, which get virtually no attention from EPA or most other states, hold good compliance records in Maine with SDWA regulations.

Like many rural states, Maine invests the bulk of its drinking water budget in training and certification programs for water system operators — the "gatekeepers" of drinking water quality. Because of its small, scattered population and a lack of heavy industry, its surface and groundwater sources remain relatively clean. The state ensures they will remain that way through comprehensive groundwater protections and restrictions on discharges to surface waters.

Currently:

- **19 states take no formal enforcement action against public water systems in violation of the Safe Drinking Water Act. Only six states enforce on more than five percent of violations;**
- **28 states take no formal enforcement action against significant noncomplier (SNC) public water systems. Only seven states enforce on 50 percent or more of their SNCs;**
- **at least 28 states have passed laws to control leaks from underground storage tanks, and at least 18 states have passed laws designed to keep agricultural chemicals out of groundwater;**
- **6 states have a statewide water conservation program.**

FOOD SAFETY

A few states have begun to play a strong role in reducing contamination of food at the source.

Scientists at the Centers for Disease Control in Atlanta estimate that foodborne infections kill about 9,000 people nationwide each year. U.S. Food and Drug Administration (FDA) microbiologists estimate that Americans suffer 20-90 million cases of illness due to contaminated food each year. And a two-year study released by the National Academy of Sciences in 1987 concluded that pesticide contamination of U.S. food supplies may be responsible for up to 20,000 cancer cases each year.[39]

When people get sick from eating contaminated food it is most likely to draw public attention if the source of contamination is clearly identifiable and a large number of people experience severe symptoms. Food contamination made headlines in 1985 when 1,350 people reported symptoms of poisoning after eating California-grown watermelons found to be tainted with the pesticide aldicarb.[40]

But foodborne illnesses commonly go unreported and their sources remain unidentified. A large percentage of the illnesses are the result of bacteria, viruses, and chemical contamination in meat, poultry, dairy products, and fish. The contaminants produce a number of non-specific symptoms including stomach-ache and diarrhea. Salmonella bacteria alone are responsible for an estimated two to four million food-poisoning cases each year in the United States.

Frequent ingestion of food contaminated with residues of agricultural pesticides or industrial chemicals can increase long-term cancer risk. While our understanding of the cumulative effect of widespread, chronic exposure to low levels of pesticides is incomplete, some pesticides can cause birth defects, mutations, or damage to kidneys, liver, nervous system, or immune system. In a recent assessment EPA ranked pesticide residues in food as the third most important environmental problem in the U.S. in terms of cancer risk.[41]

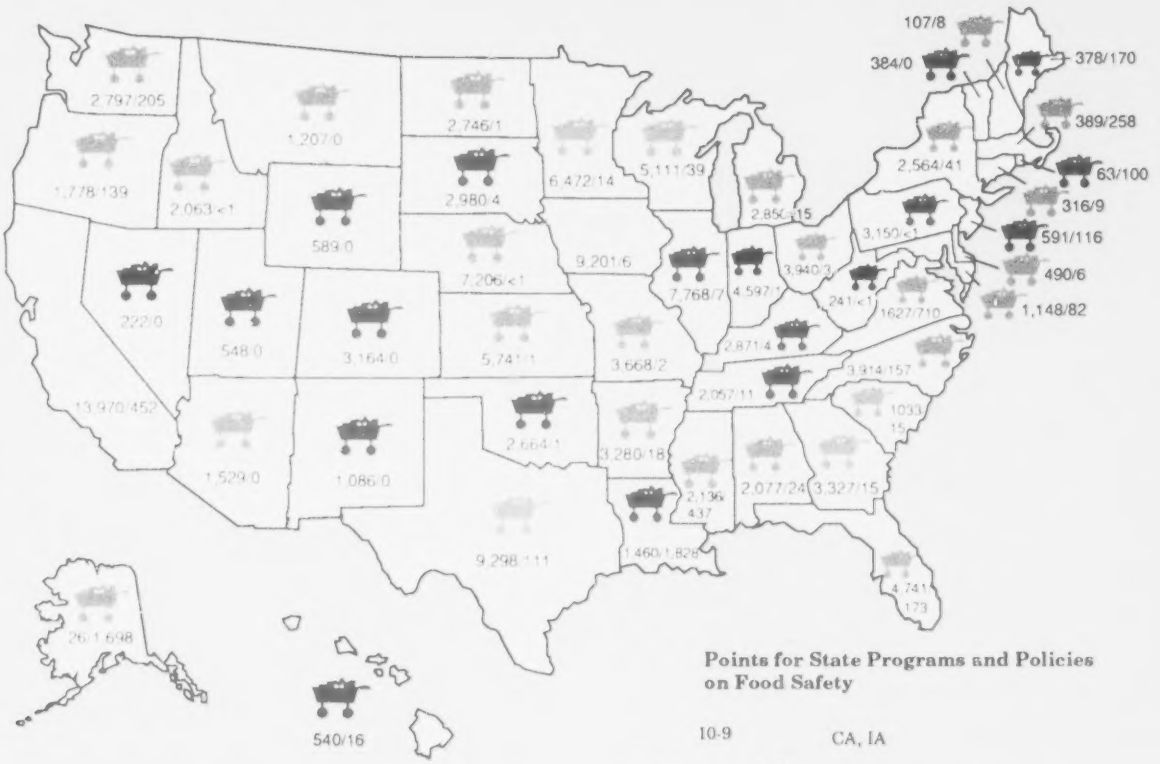
Americans suffer 20-90 million cases of illness due to contaminated food each year.

Since the passage of the nation's first food safety laws shortly after the turn of the century, the federal government has had primary responsibility for protection of our food supplies. EPA regulates the sale and use of pesticides, and establishes "tolerances" setting the maximum allowable residue levels of each pesticide used in the production of food or animal feed. Federal law requires EPA to balance the health risks of pesticides with their economic benefits in food production.

FDA is charged with conducting nationwide monitoring of samples of food and animal feed shipped in interstate commerce and with enforcing the pesticide residue tolerances. In addition, FDA is responsible for regulating the thousands of additives used in food and must approve new additives before they may be put on the market. The U.S. Department of Agriculture (USDA) is responsible for inspection of meat and poultry and enforcement of federal standards.

Between 1982 and 1985, for example, federal and state monitoring programs detected more than 110 different pesticides in commonly eaten fruits and vegetables.[42] Thousands of other compounds not routinely monitored, such as polychlorinated biphenyls (PCBs) and heavy metals, also make their way into the food chain and are often found in meat, poultry, fish and shellfish. Meat and poultry also contain residues of antibiotics and hormones that

CROPS, LIVESTOCK, POULTRY, FISH, AND SHELLFISH



Key to Reading the Map

Example: Iowa - Best Overall
10 Points for Programs and Policies

9,201/6 $9,201,000,000 cash receipts from crops, livestock, poultry, and livestock and poultry products/ 6,000,000 pounds of commercial landings of fish and shellfish

Points for State Programs and Policies on Food Safety

10-9	CA, IA
8-7	GA, MN, SC, TX, WI
6-5	AK, AL, AR, AZ, CT, DE, FL, ID, KS, MA, MD, MI, MO, MS, MT, NC, ND, NE, NH, NY, OH, OR, VA, WA
4-3	CO, HI, IL, KY, LA, ME, NJ, NM, OK, PA, RI, SD, TN, UT, VT, WY
2-1	IN, NV, WV

Source: Renew America, 1989

are administered routinely to animals in the production process. And food industry plans to irradiate foods as a preserving technique raise new concerns.

With substantial gaps in monitoring, increasing contamination of fish and shellfish, and emerging issues such as food irradiation, some states have taken on a growing responsibility to protect food supplies. Especially in the area of reducing pesticide use, states have a vital role to play in promoting sustainable agriculture, Integrated Pest Management (IPM), biological pest controls, and organic farming.

Federal and state monitoring programs detected more than 110 different pesticides in commonly eaten fruits and vegetables.

On the 300 million acres of U.S. cropland where food for human consumption and feed grains for animals are cultivated, the use of synthetic pesticides has increased dramatically during the past several decades. According to the most recent estimates of pesticide use, compiled by Resources for the Future, the states with the most pesticide use include Iowa, Illinois, Indiana, Minnesota, Texas, Ohio, Nebraska, Missouri, Kansas, and Wisconsin. These estimates are not comprehensive and do not fully reflect the large-scale use of pesticides on fruit and vegetable crops during multiple growing seasons in California and Florida.

FDA analyzed just 14,492 samples of domestic and imported foods for pesticide residues during

FOOD SAFETY—MATRIX I

	1 CASH RECEIPTS FROM CROPS, LIVESTOCK, POULTRY ($MILLIONS)	2 FARM PRODUCT AS PERCENT OF GSP	3 ACTIVE INGREDIENTS OF 25 PESTICIDES USED (THOUSAND LBS.)	4 STATE PESTICIDE USAGE REPORT		5 PESTICIDE RESIDUE TESTING AUTHORITY	6 SUSTAINABLE AGRICULTURE	7 ORGANIC LABELING/ CERTIFICATION	8 IPM ACRES (THOUSANDS)	9 IPM EXPENDITURES ($THOUSANDS)	10 BIOLOGICAL CONTROL FUNDING ($THOUSANDS)
Alabama	2,077	2.1	5,627	None		X			1,071	564	275
Alaska	26	0.1	-	Limits	84				5	50	
Arizona	1,529	1.5	1,898	Limits	86	X			552	0	478
Arkansas	3,280	5.6	11,938	Major	85	X			3,964	450	494
California	13,970	1.5	9,513	Limits	86	X	P	L		850	6,460
Colorado	3,164	2.1	3,974	Most	81	X			87	9	160
Connecticut	316	0.4	302	Limits	85	X			7	58	273
Delaware	490	1.9	1,179	None					40	55	85
Florida	4,741	1.8	6,638	Limits	85	X			197	66	2,349
Georgia	3,327	1.7	12,761	Limits	79				709	535	816
Hawaii	540	2.0	-	Most	84	X					285
Idaho	2,063	8.2	2,735	None					24	30	545
Illinois	7,768	1.6	40,953	Major	85	X			15,800	0	363
Indiana	4,597	2.4	22,824	Major	78	X			285	0	299
Iowa	9,201	10.4	46,783	Major	85	X	PC	L	855	0	109
Kansas	5,741	6.6	15,234	Major	78	X			14,958	157	268
Kentucky	2,871	3.2	6,562	Limits	79	X			46	5	534
Louisiana	1,460	0.9	9,748	Major	78	X			2,831	176	311
Maine	378	1.1	645	Limits	79	X		L	119	55	118
Maryland	1,148	0.8	3,702	Limits	85	X			654	164	132
Massachusetts	389	0.3	353	None		X		L	11	165	170
Michigan	2,850	1.1	13,744	Major	78	X			288	115	320
Minnesota	6,472	4.4	22,310	Major	84	X	P	LC	1,046	200	409
Mississippi	2,136	3.0	7,173	Major	79				3,192	489	195
Missouri	3,668	2.3	16,321	Major	78	X			145	164	160
Montana	1,207	7.8	5,380	Limits	81	X	P	L	880	98	186
Nebraska	7,206	12.0	18,156	Major	82	X	P	L	558	46	109
Nevada	222	0.6	27	Limits	85	X					
New Hampshire	107	0.5	67	Most	84	X		L	8	8	10
New Jersey	591	0.3	1,275	Most	84-85				24	420	149
New Mexico	1,086	1.9	1,382	Major	83	X			49	77	118
New York	2,564	0.4	5,807	Most	80	X			217	403	782
North Carolina	3,914	2.0	10,763	None		X			2,383	193	321
North Dakota	2,746	14.4	8,828	Major	84	X		L	4,308	30	155
Ohio	3,940	1.1	19,908	Most	83/86	X	P		212	70	902
Oklahoma	2,664	3.4	4,968	Major	81	X			153	0	133
Oregon	1,778	3.0	3,258	Most	86	X		L	15	7	488
Pennsylvania	3,150	1.0	7,661	Major	78				92	21	149
Rhode Island	63	0.4	25	None		X			3	0	14
South Carolina	1,033	1.0	5,484	Major	82	X			125	208	306
South Dakota	2,980	15.3	8,105	Major	78			L	1,259	73	21
Tennessee	2,057	1.6	5,480	None		X			270	63	194
Texas	9,298	1.6	20,668	Limits	80	X	P	LC	7,199	500	2,309
Utah	548	1.5	1,097	Most	77	X			2	0	57
Vermont	384	2.7	517	Limits	82	X		L	5	22	
Virginia	1,627	0.9	5,221	None		X			930	0	385
Washington	2,797	2.6	4,280	Limits	85	X		LC	74	10	302
West Virginia	241	0.8	696	None		X			32	0	22
Wisconsin	5,111	4.0	14,106	Most	85	X	P	L	228	0	824
Wyoming	589	1.6	1,471	Major	83	X					81

fiscal 1987, a tiny fraction of the millions of food shipments nationwide. In addition to compliance sampling done in investigations of cases of suspected contamination, FDA tested 5,659 general surveillance samples of a wide variety of domestically produced commodities, including grains, vegetables, and fruits. Residues of one or more pesticides were found in 40.2 percent of the samples. In 2.4 percent of the cases the residues were in violation of EPA tolerances. In addition, FDA found pesticide residues in 49 percent of the imported fruit samples it tested, 45 percent of the imported vegetables, and 26 percent of the imported grains and grain products. These figures understate the presence of pesticides in food, since FDA's routine laboratory methods can detect only a portion of the pesticides used on food.[43]

A few states have begun to play a strong role in reducing contamination of food at the source, by promoting reduced pesticide use. With the high cost of capital-intensive, chemical-intensive, energy-intensive, water-intensive conventional agriculture, a relatively small but growing number of producers in many localities around the country have begun moving to alternatives.

Evidence indicates that alternatives such as low-input agriculture, IPM, biological controls, and organic farming can not only reduce chemical dependency but can be cost-effective as well.

Eight states have sustainable agriculture programs that are either state-funded or coordinated by state employees—California, Iowa, Minnesota, Montana, Nebraska, Ohio, Texas, and Wisconsin. Some of these programs are highly developed, while others are just beginning.

Iowa's Groundwater Protection Act of 1987 established a comprehensive program to promote reduced use of pesticides and synthetic nitrogen fertilizers. The law established and provided funding for the Leopold Center for Sustainable Agriculture, the nation's first and only state center. This law also provided support for an Integrated Farm Management Demonstration Program to encourage adoption of sustainable agriculture methods, and for sustainable agriculture research at Iowa universities. Iowa's program is funded in part by new fees on pesticides and fertilizers.[44]

Minnesota and Wisconsin have established sustainable agriculture programs within their state agriculture departments. Minnesota's program includes on-farm research and demonstrations and a revolving loan fund to aid farmers in making changes in their operations. Wisconsin's program includes a sustainable agriculture demonstration grant program to fund on-farm projects. California supports research, demonstration, planning, and information projects through universities.

Organic farming involves substituting biological pest controls and natural fertilizers for synthetic pesticides and fertilizers. Thirty thousand farms use organic techniques today. The number of organic farms in California reportedly doubled between 1982 and 1985. Fifteen states have enacted laws providing for the labeling of foods as organic. This is especially significant since there is no official federal definition of organically grown food. Three states—Minnesota, Texas, and Washington—have also instituted programs to certify farms as organic.

Biological controls are crucial to any strategy to reduce dependence on pesticides. Biological control refers to the use of predators, parasites, and diseases which attack pests whose suppression is desired, for example the introduc-

MATRIX KEY

BASIC STATE AGRICULTURAL STATISTICS

1. Cash Receipts from Crops, Livestock, Poultry, and Livestock and Poultry Products ($millions): 1986.

2. Farm Product as Percent of Gross State Product: 1986.

PESTICIDES

3. Pesticide Use, Active Ingredient of 25 Pesticides (thousand lbs.): Mid-1980s, accounting for about one-half of cropland pesticide use.

4. Evaluation of State Pesticide Usage Report and Latest Year for which Usage Reported: Report covers pesticide use on (Most) crops or (Major) crops. Report has major limitations (Limits) or there is no report (None). Reports up to 1986 are indicated.

5. Pesticide Residue Testing Authority: X= pesticide residues provision in state food and drug law.

ALTERNATIVES TO CONVENTIONAL AGRICULTURE

6. Sustainable Agriculture Programs: P= Program, C= Center. Programs are either funded or legislated by the state, or their coordinators are state employees.

7. Organic Labeling and Organic Farm Certification: Labeling (L) or certification (C) established by state statute or regulation.

8. Cropland Acres Influenced by Integrated Pest Management (IPM) (thousands) : 1987. Blank= No report.

9. State Cooperative Extension Integrated Pest Management Expenditures ($thousands) : 1987. Blank= No report. O= report indicated that no funds were spent on IPM. Number is a total of state cooperative extension discretionary funds and state-earmarked funds.

10. Biological Control Funding ($thousands) : 1986. Sum of state and federal funds spent at state agricultural experiment stations and cooperating institutions.

For sources, see page 46.

FOOD SAFETY—MATRIX II

	11	12	13	14	15	16	17	18		
	MEAT/POULTRY INSPECTION	COMMERCIAL LANDINGS, FISH AND SHELLFISH (THOUSAND LBS.)	FISH AND SHELLFISH PROGRAM EXPENDITURES ($THOUSANDS)	STATE SHELLFISH SANITATION PROGRAM	FOOD IRRADIATION OPERATIONS	FOOD ADDITIVE AMENDMENTS	STATE TESTING FOR CONTAMINANTS	FDA PESTICIDE MONITORING RESULTS		
Alabama	MP	24,459	230	C		AC	P A	62	27	1
Alaska	MP	1,697,547	1,114	C	DOE	AC	P MD	12	2	0
Arizona	MP	0	10			AC	P MDA	345	217	33
Arkansas		18,179	2		1R	AC	PC A	107	45	2
California		451,663	236	NC	3C	AC	PCMDA	2100	822	50
Colorado		0	28			AC	P MD	68	24	4
Connecticut		8,562	301	NC		AC	PCM A	18	6	1
Delaware	MP	6,022		C			P A	24	10	0
Florida	MP	172,734	625	C	DOE	AC	P A	333	86	9
Georgia	M	14,961	3,322	C	1C		P A	151	38	2
Hawaii	MP	16,088	41		DOE	AC	P A	42	0	0
Idaho		420	2				P MDA	50	26	0
Illinois	MP	7,081	42		1C,2CR	AC	P M	102	65	1
Indiana	MP	1,399				AC	P	34	11	0
Iowa	MP	5,764			DOE	AC	PC DA	86	37	0
Kansas	MP	637	5			AC	P MD	46	12	0
Kentucky		4,105	3			AC	P DA	12	2	0
Louisiana	MP	1,827,586		NC		AC		91	18	3
Maine		170,082	550	NC			P M	23	9	0
Maryland	MP	81,658	62	C		AC	P M	70	24	1
Massachusetts		258,066	609	NC	1CR	AC	PC	69	49	1
Michigan		15,072	80			AC	PCM A	102	35	5
Minnesota		13,730	6			AC	PCMD	152	60	0
Mississippi	MP	436,729	21	C	1CR		PCMDA	43	22	0
Missouri		1,561	16			AC	PCMDA	120	47	0
Montana	MP	0	2			AC	PC A	0	0	0
Nebraska		187				AC	P D	22	10	0
Nevada		0	2			AC		4	2	0
New Hampshire		8,287	27	C		AC		11	5	0
New Jersey		116,141	3,135	NC	3CR,1R	AC	M A	79	25	0
New Mexico	MP	0						25	11	0
New York		40,882	4,422	NC		AC	PCM A	188	65	9
North Carolina	MP	156,608	478	C	1R	AC	PC DA	75	29	0
North Dakota		1,209				AC	PCMD	26	5	0
Ohio	MP	3,217			1C,1CR	AC	PC	10	44	0
Oklahoma	MP	1,329			DOE	**	P MDA	13	8	0
Oregon		138,545	63	NC		AC	PCMDA	95	12	1
Pennsylvania		195	26	C		**		92	29	0
Rhode Island		100,150	2,566	C		AC		12	3	0
South Carolina	MP	15,003	2	C	1CR	AC	PCMDA	36	16	0
South Dakota	M	3,517				A	PC	11	8	1
Tennessee		11,471	18			AC	P A	29	9	0
Texas	MP	111,216	451	NC	1CR	AC	PCM A	283	148	9
Utah	M	0			1CR	AC	P M	5	1	0
Vermont	MP	0	<1			AC	P	16	0	0
Virginia	MP	709,595	1,152	C	1C	AC	P M A	46	20	1
Washington		205,073	350	C	DOE	AC	PCM A	81	30	0
West Virginia	M	54				AC		5	3	1
Wisconsin	MP	38,944	18			AC	PCM	169	100	0
Wyoming	MP	0				AC		0	0	0

tion of predatory insects to control the population of other insects, or the conservation of native pest antagonists. USDA has 1989 funding of $85 million for non-chemical pesticide research. California, Florida, and Texas have the largest combined federal and state funding for biological control work at state agricultural experiment stations and cooperating institutions.

Pesticide use can also be reduced through a combination of practices known as IPM. IPM does not exclude the use of chemicals, but integrates their use with non-chemical pest control methods such as biological controls, crop rotation, use of pest-resistant crop varieties, and modified planting and harvesting practices. The IPM strategy is to keep insect and weed populations below a threshold above which crop loss exceeds control costs.

Many states use a portion of their agricultural extension service discretionary funds for IPM. At least seven states specifically earmark funds for IPM programs—California, Connecticut, Delaware, Massachusetts, New Jersey, New York, and Texas.

During the 1970s the Food and Drug Administration found organochlorine pesticides such as DDT and its chemical relatives in 90 percent of meat, fish, poultry, and dairy samples tested.[45] Studies by FDA and USDA in the 1980s indicate that residues of these persistent chlorinated pesticides continue to occur at low levels, especially in foods of animal origin, even though they have not been used in agriculture for more than a decade. USDA's 1986 National Residue Monitoring Program also found arsenic residues in 47 percent of the samples of market hogs and young chickens and turkeys tested.[46]

All meat and poultry that enter interstate commerce must be checked by federal inspectors, while states have the option of either running their own inspection programs for meat and poultry in intrastate commerce or allowing USDA to do the inspections. Twenty-eight states have opted to have their own meat inspection programs, while 24 have done so for poultry. State inspection programs receive half of their funding from the federal government and must be equivalent to the federal program.

The National Academy of Sciences concluded in a 1985 study that, regardless of who does the inspections, the key to minimizing the hazards from chemical residues and infectious agents in meat and poultry "is to control these agents at their point of entry into the food chain, i.e., during the production phase on the farm and in feedlots."[47]

In addition to the contaminants that may bioaccumulate from feed grains, meat and poultry may also contain residues from an assortment of drugs administered to the animals, including antibiotics and hormones. Subtherapeutic doses of antibiotics are used to minimize the spread of diseases among animals raised under factory conditions such as exist in feedlots and to promote growth. The U.S. Office of Technology Assessment estimated in 1987 that feed containing antibiotics is fed to 60 percent of cattle, 90 percent of pigs, 90 percent of calves raised for veal, and almost all poultry.[48]

Since bacteria can develop resistance to antibiotics there is a danger that antibiotics given to animals will lose their effectiveness in treating disease in humans. For this reason the subtherapeutic use of antibiotics in animal feeds has been banned in the United Kingdom, West Germany, Holland, Sweden, Norway, and Denmark.

There have been several legislative attempts to ban the subtherapeutic use of antibiotics in the United States since the late 1970s but none have succeeded. Nor have

MATRIX KEY

MEAT, POULTRY, AND FISH AND SHELLFISH

11. State Meat/Poultry Inspection Programs: M= meat, P= poultry.

12. Commercial Landings, Fish and Shellfish (thousand lbs.) : 1987. Distribution among states of some landings is estimated.

13. Fish and Shellfish Program Expenditures ($thousands): 1985-86. This includes expenditures for inspection, monitoring, patrol and relay, survey of harvest waters, etc. for fish and shellfish. A blank indicates that no expenditures were reported.

14. FDA Evaluation of Conformity of State Shellfish Sanitation Program with the Requirements of the National Shellfish Sanitation Program: as of 1988. C= In conformance, NC= Not in conformance.

FOOD PROCESSING

15. Food Irradiation Operations: as of January 1987. These operations irradiate food on a commercial (C) or research (R) basis, or both (CR). DOE= planned U.S. Dept. of Energy food irradiation facility.

16. Food Additive and Color Additive Amendments: State has adopted a Food Additive (A) or Color Additive (C) Amendment to the Basic Food Law. **= Food and color additives are dealt with in a manner other than by an amendment.

RESIDUE MONITORING

17. Contaminants for which State Conducted Testing: 1985-1986. P= Pesticides, C= Industrial Chemicals, M= Heavy Metals, D= Drugs, A= Aflatoxin. A blank indicates that no testing was reported.

18. Results of Federal (Food and Drug Administration) Pesticide Monitoring: Number of samples taken in the state/ Number of samples found to contain residues of one or more pesticides/ Number of samples found to contain residues in violation of EPA tolerances. It would not be statistically valid to compute state food contamination rates from these data. 10/1/86-9/30/87. Domestic surveillance samples not including meat and poultry (under USDA jurisdiction).

For sources, see page 46.

any of the states legislated such a ban.

Hormones, used to promote rapid growth, raise a similar issue. The European Economic Community adopted a ban on imports of meat from animals raised with synthetic hormones, which went into effect on January 1, 1989.

Legislation was introduced in Wyoming in 1989 to establish a commodity certification program under which a state agency could certify meat to be hormone-free. The legislation is generic and would also allow certification of antibiotic-free meat or organically grown food.

The issue of chemical contamination is particularly serious for fish and shellfish because they are often at the end of long food chains and can accumulate relatively large amounts of pesticides, industrial chemicals, and toxic metals that pollute lakes, rivers, and coastal waters. A U.S. Fish and Wildlife Service study revealed in 1981 that nearly every fish sample taken contained detectable amounts of chlorinated hydrocarbon pesticides.[49] In addition, raw or spoiled fish containing bacteria, viruses, or natural toxins account for one-fourth of the food poisoning cases reported each year in the U.S.

Yet fish and shellfish are not subject to mandatory federal inspection, unlike meat and poultry. Only 11 percent of the 1987 catch was inspected in a voluntary federal program in which clearly visible hazards were checked.[50] In contrast with the United States, Canada has had a mandatory national inspection program since 1967.

Commercial landings of seafood within the United States vary greatly from state to state due to geography, with Alaska and Louisiana accounting for 50 percent of the total, including 56 percent of the fish and 29 percent of the shellfish. Together with California, Florida, Massachusetts, Mississippi, Virginia, and Washington they account for 85 percent of the U.S. catch.

In cooperation with the FDA and the shellfish industry, 23 shellfish harvesting states participate in the National Shellfish Sanitation Program (NSSP). In this program FDA evaluates the states' conformity with voluntarily agreed-upon certification requirements. FDA concluded in 1988 that nine states have major shellfish program deficiencies of public health significance.[51] Problems include allowing harvesting in inappropriate areas, poor monitoring of pollution conditions in harvesting areas, and unsanitary conditions at processing facilities.

More than half of the U.S. shellfish harvest comes from states which are not in conformity with the NSSP requirements. In its 1988 report FDA concludes there is growing concern about the quality of state regulation of shellfish harvesting, resulting in large part from inadequate program funding.

...fish and shellfish are not subject to mandatory federal inspection...

To ensure safer fish and shellfish, states must have strong programs to prevent water pollution as well as strong monitoring programs to deal with the problems of contamination due to past practices.

With the assistance of several thousand chemical additives, the food industry has produced a dazzling array of laboratory-designed food products to respond to and shape consumers' desires regarding convenience, variety, appearance, and taste. The average American consumes an estimated five pounds of food additives each year including preservatives, sweeteners, artificial coloring, and artificial flavoring, as well as thickening, stabilizing, leavening, bleaching, and emulsifying agents.[52]

FDA regulates food additives under the Federal Food, Drug, and Cosmetic Act. Under the 1958 Food Additives Amendment to this law FDA must review safety data on each new additive and find that it is safe before the additive can be marketed. Under the Delaney Clause, an additive must be banned if it is found to be an animal carcinogen.

The average American consumes an estimated five pounds of food additives each year.

Sulfiting agents are the only food additives now in use that are known to have caused human deaths. These preservatives, which are used to make lettuce look fresher and to mask spoilage in shrimp, cause hypersensitivity reactions in hundreds of thousands of asthmatics. In the early to mid-1980s at least six people, and possibly many more, died from eating restaurant food that had been treated with sulfites.[53]

By 1985 California and Washington, along with Chicago and other local governments, had moved ahead of FDA in responding to public concern by either banning the use of sulfites in restaurants or requiring warning signs when sulfites were added to foods. More recently FDA banned the use of sulfites on most fruits and vegetables sold in restaurants, and labeling is required for sulfites applied in grocery stores and in wine.

All but a handful of states have additive provisions in their basic state food and drug laws. Usually these provisions duplicate the requirements of federal law. They allow a state to enforce the federal

requirements, rather than relying entirely on FDA's enforcement.

The Food Additives Amendment also requires that food irradiation be regulated as an additive. In this controversial process, food is placed in a shielded location and exposed to cobalt-60, cesium-137, or electron beams for the purpose of killing microorganisms and insects in order to reduce spoilage and extend shelf life, and to retard natural growth processes such as potato sprouting.

FDA has so far authorized irradiation of dried herbs and spices, fruits and vegetables, pork, wheat and wheat flour, white potatoes, and dried enzyme preparations. FDA requires labeling with a special logo on whole foods but not on ingredients or spices.

Eighteen operations in 11 states currently irradiate spices on a commercial scale, or for combined commercial and research purposes. The U.S. Dept of Energy provides cesium-137, and cleanup of contamination if required. DOE has $15 million in funding to establish regionally-based food irradiation facilities in six states.

Critics charge that FDA's approval of food irradiation is at best unnecessary and premature—without proper testing procedures. They argue that some studies have found chromosomal abnormalities in children and an increase in tumors in animals fed irradiated food, that irradiation destroys vitamins and other nutrients, and that it may produce new or mutant strains of radiation-resistant bacteria and viruses.[54] Concerns have also been raised about irradiated produce sold without labeling in Latin America and its possible export to the United States.

Maine is the only state that has banned the sale of irradiated food, with a law in effect since 1987, although Congress and at least eight states have seen legislative activity on this issue. A ban passed by New Jersey legislators was vetoed by the governor in 1988.

Many states have programs to test food for residues of various contaminants. In 1985 and 1986, according to reports submitted to FDA, 41 states did at least some testing for pesticide residues, 20 tested for industrial chemicals, 25 for heavy metals, 17 for drugs, and 26 for aflatoxin. The amount of sampling and analysis done varies greatly among the states. Some states, such as California, have extensive monitoring programs.

California also adopted a unique measure for addressing food safety when voters approved Proposition 65, which requires the labeling of products containing chemicals which are believed to cause cancer or birth defects. This law remains controversial—it received strong public support but is opposed by much of the food industry.[55]

States can play an important role in filling gaps in monitoring of the food supply and enforcement of food safety requirements, especially given the limitations of the federal presence. It may be impossible to eliminate food contaminants from all sources, but we can at least do a better job of controlling those from man-made sources, such as by developing alternatives to pesticide-intensive agriculture. Taking these steps will reduce the incidence of illness, cancer, and death, and promote the development of a safer food supply.

FOOD SAFETY SNAPSHOT

Iowa receives ten percent of its income from crops and livestock (4th largest in the United States) and contributes 6 percent of U.S. production of crops and livestock (3rd largest). The state has developed an assortment of programs capable of preventing or reducing food contamination, most notably its sustainable agriculture program. The centerpiece of the program, the Leopold Center for Sustainable Agriculture, derives its funding from the Groundwater Protection Act of 1987 which taxes pesticides and synthetic nitrogen fertilizers. The Act also authorizes continuation of the Integrated Farm Management Demonstration Program, which uses demonstration programs to encourage adoption of sustainable agriculture methods. Fees also fund sustainable agriculture research at Iowa universities. Iowa also has an organic labeling law and monitors food for residues of four major classes of contaminants—pesticides, industrial chemicals, drugs, and aflatoxins.

Currently:

- **eight states have sustainable agriculture programs;**
- **six states have recent pesticide usage reports covering most crops;**
- **15 states have organic labeling and three have organic farm certification;**
- **24 states have meat and poultry inspection programs and an additional four have meat inspection programs;**
- **14 states have shellfish sanitation programs in conformance with the requirements of the National Shellfish Sanitation Program while the programs of nine states are not in conformance;**
- **11 states house operations irradiating mainly spices on a commercial basis;**
- **six states lack food additive and seven lack color additive amendments to their basic food laws; and**
- **five states tested food for residues of all five major classes of contaminants.**

GROWTH AND THE ENVIRONMENT

The question is not whether communities will grow— but how they will grow, and at what cost.

To many people, the American Dream appears to be at odds with a healthy environment. This perception has led to arguments that environmental protection costs jobs and prevents communities from sharing in economic growth. But the question is not whether communities will grow — but how they will grow, and at what cost.

Along California's rugged and scenic coast lies the city of Morro Bay, home to retirees, a few resort motels, and a modest commercial fishing industry. Although a quiet place, the city is in the path of a real estate boom expanding rapidly out of the Los Angeles area four hours to the south. Economic growth and population pressures are stressing the city's natural resources, which include a water supply that dries up every four years. With encouragement from the state's coastal commission, Morro Bay acted to protect its fragile coastline by imposing a limit of 70 new homes per year, and requiring builders to save twice the water their new buildings will use by retrofitting the community with water-conserving devices.[56]

Morro Bay's creative response to its growth dilemma is the kind of solution state and local governments are beginning to examine to protect water supplies, reduce air pollution and energy use, and maintain valuable farmland and other critical areas in the face of growth pressures.

In the past, the impacts of growth on the environment were seen largely as a function of population expansion. Energy use, water consumption, and solid waste generation seemed to have per capita equations fixed to an idea that individuals consume a set amount of resources. However, the impact of population on the environment is more complex. While the stress of population is a fundamental part of the problem, use of inefficient technologies and institutionalization of waste can geometrically increase human impact. Utilization of water widgets in showers, building code standards to increase energy efficiency, recycling programs, encouragement of mass transportation and regular inspection of car exhaust systems, statewide land-use planning, and a host of other policies can radically reduce both consumption and pollution in the U.S.

The amount of waste and inefficiency built into our resource use is clearly evident. Since 1960, the U.S. population has increased by 34 percent. At the same time the volume of solid waste has grown by 80 percent. Water consumption has increased by 51 percent. And energy use has increased by 69 percent.[57]

Addressing institutionalized waste in our resource use is a first step in managing the pressures of growth and in moving toward the ideal of sustainable systems. In bits and pieces state and local governments have begun to develop policies that will reduce the impact of growth on the environment. Some of the most impressive progress has been in energy use.

. . . use of inefficient technologies and institutionalization of waste can geometrically increase human impact.

At one time electricity consumption was considered to have an "iron link" to economic growth. But today, partly because of conservation and increased energy efficiency, we use 25 percent less energy for every dollar of Gross National Product than we did in 1974.[58]

Policies to reduce fossil fuel consumption were introduced in the wake of the energy crisis of the 1970s. The federal government encouraged states to develop

CHANGE IN POPULATION AND ENERGY CONSUMPTION

Key to Reading the Map

Example: Oregon - Best Overall
10 Points for Programs and Policies

54/93
54 percent increase in population 1960-1987
93 percent increase in energy consumption 1960-1986

In addition to energy consumption shown on the map rates of water consumption and solid waste production have also far outstripped the rate of population growth over the last 25 years.

Points for State Programs and Policies on Energy, Water, Solid Waste, and Land Use

10-9	CA, OR
8-7	CT, FL, MA, MD, ME, MN, NC, NJ, NY, PA, RI, VT, WI
6-5	CO, DE, GA, HI, IA, IL, MI, NH, OH, VA, WA
4-3	AK, AZ, ID, IN, KS, KY, MO, ND, NE, NM, NV, OK, SC, TX, UT,
2-1	AL, AR, LA, MS, MT, SD, TN, WV, WY

Source: Renew America, 1989

energy conservation programs. Substantial savings have occurred in these programs, especially in the area of building codes that require energy-efficient design for insulation, lighting and water heating. Although 31 states currently have some form of these building codes statewide, only eight are considered to have relatively comprehensive standards.[59]

Another potentially successful energy strategy is least-cost planning. It requires utilities to provide energy at the least possible cost and to consider all alternatives in meeting this objective. As a result of least-cost planning provisions, California Pacific Gas and Electric has been forced to make improvements in energy effiiciency through conservation and renewable energy, rather than spend $20 billion on new coal and nuclear-powered plants it had proposed. In spite of its efficacy, only ten states have adopted comprehensive policies to integrate least-cost planning in investment decisions of utilities.[60]

There have also been ongoing efforts to develop energy sources with low environmental impact, but support for such programs is in decline. At one time 24 states provided a tax credit for investments in renewable energy, such as solar, wind, hydro and geothermal power. Currently, only 15 states provide such incentives, and many of these remaining tax credits may expire in the next few years. This waning interest can be traced to lower oil prices in the 1980s, the Reagan Administration's lack of support for renewable energy, and to a belief in the need to bring about a resurgence of the nuclear industry in the 1990s.[61]

As the savings since 1974

GROWTH AND THE ENVIRONMENT—MATRIX I

	1 POPULATION (THOUSANDS)	2 POPULATION CHANGE 1960-1987	3 ENERGY CONSUMPTION	4 CHANGE IN ENERGY CONSUMPTION 1960-1986	5 ENERGY CONSUMPTION BY END USE	6 ENERGY CONSERVATION PROGRAMS	7 CARBON EMISSIONS	8 RESIDENTS IN AREAS FAILING TO MEET CLEAN AIR ACT STANDARDS	9 AIR POLLUTION CONTROL BUDGETS	10 AUTO EMISSIONS I/M PROGRAMS
Alabama	4,083	25%	1,454	77%	19/13/44/24	1	527	968 (24%)	54/43/3	None
Alaska	525	132%	474	677%	9/16/43/32	1	407	300 (58%)	49/51/0	Local/S**
Arizona	3,386	160%	839	206%	21/21/23/36	1	285	2,744 (86%)	42/52/6	Local/S*
Arkansas	2,388	34%	751	94%	21/13/39/28	2	462	0(0%)	45/42/12	None
California	27,663	76%	6,471	92%	18/17/27/39	B,T,3	160	25,398 (96%)	5/94/1	Local/S**
Colorado	3,296	88%	868	107%	22/25/21/32	1	279	2,714 (84%)	29/65/6	Local/S*
Connecticut	3,211	27%	704	42%	30/23/19/28	3	147	3,174 (100%)	60/35/5	State/W
Delaware	644	44%	214	50%	19/13/41/28	T,1	385	413 (66%)	52/43/5	Local/W
Florida	12,023	143%	2,666	245%	26/21/15/37	B,3	245	5,789 (51%)	12/84/4	None
Georgia	6,222	58%	1,828	192%	21/15/30/34	1	345	2,204 (37%)	35/65/0	Local/W**
Hawaii	1,083	71%	231	136%	9/10/25/56	T,1	228	0(0%)	39/61/<1	None
Idaho	998	50%	329	83%	22/19/34/25	T,2	207	309 (31%)	75/25/0	Local/W*
Illinois	11,582	15%	3,357	35%	25/18/35/21	3	263	8,999 (78%)	67/28/4	Local/W
Indiana	5,531	19%	2,221	47%	19/11/46/25	2	579	2,470 (45%)	64/35/1	Local/S
Iowa	2,834	3%	894	50%	24/15/36/24	3	366	1,180 (41%)	71/29/0	None
Kansas	2,476	14%	972	54%	18/16/38/28	1	429	867 (35%)	66/3/31	None
Kentucky	3,727	23%	1,301	62%	20/13/41/26	1	565	1,532 (41%)	39/55/6	Local/W*
Louisiana	4,461	37%	3,229	120%	9/8/63/20	1	695	2,647 (59%)	40/24/36	Local/W*
Maine	1,187	23%	329	68%	24/14/32/31	3	256	1,013 (87%)	53/35/12	None
Maryland	4,535	46%	1,140	71%	25/14/32/28	2	230	3,546 (81%)	44/55/1	Local/W
Massachusetts	5,855	14%	1,279	26%	29/22/18/30	B,T,2	188	5,822 (100%)	52/41/7	State/W*
Michigan	9,200	18%	2,586	42%	26/15/34/25	T,1	308	8,169 (90%)	45/55/0	Local/W
Minnesota	4,246	24%	1,219	74%	25/15/33/28	B,2	235	2,649 (63%)	54/41/5	New/Na
Mississippi	2,625	21%	883	149%	18/13/38/31	1	424	0(0%)	59/41/0	None
Missouri	5,103	18%	1,431	65%	26/18/24/32	2	329	2,310 (46%)	86/14/<1	Local/W**
Montana	809	20%	315	43%	18/14/42/26	2	520	429 (52%)	64/36/0	None
Nebraska	1,594	13%	489	60%	25/22/24/29		300	735 (46%)	67/33/0	None
Nevada	1,007	253%	295	239%	21/15/24/39	3	373	914 (98%)	48/51/1	Local/W**
New Hampshire	1,057	74%	216	114%	30/15/23/32	2	193	898 (90%)	62/30/8	Local/Na
New Jersey	7,672	26%	2,182	70%	22/19/23/36	T,2	202	7,562 (100%)	35/54/11	State/S
New Mexico	1,500	58%	468	46%	15/18/31/37	T,2	509	492 (34%)	50/50/0	Local/Na
New York	17,825	6%	3,397	16%	28/28/19/25	B,2	137	13,008 (73%)	49/43/8	Local/W*
North Carolina	6,413	41%	1,750	132%	23/16/32/30	B,T,2	295	441 (7%)	52/46/2	Local/W**
North Dakota	672	6%	306	105%	18/13/48/22	T,1	968	0(0%)	57/25/17	None
Ohio	10,784	11%	3,553	20%	23/15/40/22	2	382	8,570 (80%)	39/32/29	Local/Na
Oklahoma	3,272	41%	1,208	111%	19/15/39/27	T,1	429	552 (17%)	74/26/<1	Local/W**
Oregon	2,724	54%	801	93%	23/18/27/32	T,3	176	1,814 (68%)	29/53/18	Local/S**
Pennsylvania	11,936	5%	3,272	2%	24/14/37/24	3	357	10,513 (89%)	51/49/0	Local/S
Rhode Island	986	15%	195	6%	30/22/19/29	T,1	159	968 (100%)	68/32/0	State/W
South Carolina	3,425	44%	1,081	141%	20/13/41/25	T,2	330	569 (17%)	40/60/0	None
South Dakota	709	4%	198	55%	27/15/27/30	B,1	300	76 (11%)	75/25/0	None
Tennessee	4,855	36%	1,657	80%	22/17/34/28		397	2,064 (43%)	46/54/0	Local/S
Texas	16,789	75%	8,780	100%	12/11/54/23	3	510	7,652 (47%)	24/24/52	Local/W**
Utah	1,680	89%	478	60%	22/14/34/30	T,1	412	1,291 (78%)	69/28/3	Local/W*
Vermont	548	41%	115	89%	27/16/24/33	3	152	176 (33%)	68/32/0	None
Virginia	5,904	40%	1,671	111%	23/20/25/31	2	224	1,438 (25%)	40/60/0	Local/W
Washington	4,538	59%	1,655	123%	21/16/33/30	3	209	2,713 (62%)	44/56/0	Local/S
West Virginia	1,897	2%	720	19%	17/11/53/19	1	1179	506 (26%)	54/46/0	None
Wisconsin	4,807	22%	1,283	57%	27/16/33/25	B,3	287	2,873 (60%)	45/35/20	Local/W
Wyoming	490	48%	346	145%	11/10/61/19	1	996	45 (9%)	46/54/0	None

indicate, energy efficiency holds the greatest immediate promise. The best available lights, motors, appliances, and other devices have the potential to reduce our national energy bill from $400 billion to $270 billion, or less, and provide a cornerstone for reducing pollution.

Addressing institutionalized waste in our resource use is a first step in managing the pressures of growth.

In examining an eight state area from Michigan to Virginia, one study shows that by using aggressive end-use efficiency measures, no new power plants will be needed until 2005, and plants contributing the pollution most expensive to control can be shut down.62 And at the local level, a number of cities and towns are looking to substantially lower their energy use. The city of Austin, Texas, which has a non-profit public power system, plans to reduce municipal power demand by 20 percent by 1997.

These efficiency measures have broader effects, too. Reducing the burning of fossil fuels will cut down on carbon dioxide emissions, a contributor to the "greenhouse effect," or global warming. If global temperatures continue to rise, changes in weather could significantly disrupt agriculture, and melt polar ice-caps raising the levels of the oceans and flooding coastal cities.

States play an important role in controlling air pollution. While the federal Environmental Protection Agency sets air pollution standards, states are responsible for issuing permits, monitoring emissions and enforcing violations for stationary air pollution sources. They also must develop plans for reducing air pollution to meet EPA's clean air standards.

Since the mid-1970s significant progress has been made in reducing air pollution nationwide. Average ozone levels decreased by 21 percent, from 1977 to 1986, and sulfur dioxide levels declined by 37 percent over the same time period.63 Among the federal actions having the greatest impact on air quality was the ban on lead in gasoline. From 1977 to 1986, average lead concentrations decreased by 87 percent. Additionally, automobile emission technology improved fuel efficiency from 13 to 18 miles per gallon since 1977.

Yet, air quality gains could be greater. In California, 96 percent of the residents live in counties that fail to meet clean air standards for one of EPA's four criteria pollutants. In the East, entire states violate these standards, including Massachusetts, Rhode Island, Connecticut and New Jersey.64

Pollution from mobile sources could be cut further by ensuring that vehicles comply with federal emission standards. Currently just three states have comprehensive programs with standards that include an under-the-hood inspection, critical for accurately testing car exhaust. Sixteen states have yet to adopt any inspection and maintenance program, in spite of the threat of EPA sanctions.

Mass transportation programs can also help, but unfortunately a 1984 Department of Transportation study shows that the percent of workers commuting by public transportation fell from 7.3 to 5.5 percent from 1969 to 1983.

Water consumption issues are similar to energy and air pollution concerns in many ways. Solutions range from simple technological

MATRIX KEY

1. State Population: 1987, in thousands.

2. Population Change: 1960-1987, in percent.

3. Energy Consumption: 1986, in trillions of BTU's.

4. Change in Energy Consumption: 1960-1986, in percent.

5. Energy Consumption by End-Use: Percent of total energy consumption used for Residential/ Commercial/Industrial/Transportation in 1986.

6. State Energy Conservation Programs: B= substantial building standards for energy efficiency; T= tax credit for renewable energy investments; 1,2, or 3= least-cost planning score, 3=comprehensive, 2=making progress, 1=no program.

7. Carbon Emissions: Metric tons of carbon released to atmosphere per one million dollars of Gross State Product.

8. Air Pollution: Residents living in counties not meeting EPA's clean air standards, in thousands of people, June 1988; and percent this represents of total state population.

9. State Air Pollution Control Program Budgets: Percent federally funded/ state funded/percent from emissions and permit fees charged to polluters, 1985 and 1986.

10. State Car Emissions Inspection and Maintenance Programs: State= program is administered by state agency; Local= state program run by local agencies; None= no state program; New= program is new and not evaluated; W= inspection standards are weak; S= inspection standards are strong; *= includes a limited under-the-hood inspection; **= includes a complete under-the-hood inspection; Na= no information.

For sources, see page 46.

GROWTH AND THE ENVIRONMENT—MATRIX II

	11 WATER CONSUMPTION	12 WATER CONSUMPTION BY END-USE	13 WATER POLLUTION: RIVERS	14 WATER POLLUTION: LAKES	15 WATER POLLUTION PERMITS	16 WATER POLLUTION PERMIT INSPECTION	17 LANDFILL CAPACITY	18 PERCENT SOLID WASTE STREAM RECYCLED	19 WASTE REDUCTION AND RECYCLING PROGRAMS	20 URBAN LAND AREA CHANGE 1960-1980	21 PRIME FARMLAND ACRES (THOUSANDS)	22 LAND-USE MANAGEMENT
Alabama	541	20/14/45/21	1,218 (30%)	0 (100%)	S*	100*/98	5 - 10	2%	NC /---	111	7,270	
Alaska	27	0/48/41/11	1,715 (1%)	120,200 (2%)	E	100/34	>10	<1%	N /P	1940	nd	
Arizona	4880	89/7/3/1	786 (8%)	4,807 (31%)	E	13/95	>10	1%	NC /---	179	1,091	
Arkansas	3485	97/2/1/1	5,490 (100%)	No Data	S*	100/94	>10	1%	NC /---	173	11,625	
California	22029	93/5/2/0	3,494 (36%)	668,390 (92%)	S	43/100	>10	11%	Y /B,P	79	5,891	C,P,D
Colorado	7730	97/2/1/0	No Data	No Data	S	58/97	5 - 10	nd	N /---	194	1,686	G
Conn.	106	5/70/12/14	269 (10%)	1,865 (45%)	S*	100*/99	< 5	2%	Y /M,B,P	30	355	W,P
Delaware	39	74/15/10/3	206 (89%)	No Data	S	100/85	> 10	7%	N /B,P	109	431	G,W
Florida	2787	77/14/9/1	2,118 (71%)	304,258 (87%)	E	71/99	5 - 10	1%	Y /M,B,P	197	1,105	G,W
Georgia	838	60/18/9/14	850 (85%)	54,305 (100%)	S*	81/100	> 10	1%	NC/--	138	7,728	
Hawaii	223	51/46/3/0	No Data	No Data	S*	100/97	5 - 10	3%	N /---	-36	297	G
Idaho	11720	99/<1/<1/0	1,243 (100%)	0 (100%)	E	100/91	> 10	<1%	NC/---	108	3,413	
Illinois	686	17/23/41/18	1,521 (24%)	22,539 (10%)	S	78/88	5 - 10	2%	Y /P	74	21,253	D
Indiana	454	19/14/50/17	No Data	2,617 (94%)	S	71/85	5 - 10	5%	NC /---	95	13,511	
Iowa	473	51/32/7/11	4,234 (24%)	19,951 (91%)	S*	89/90	> 10	3%	Y /B,P	60	18,683	
Kansas	4997	96/2/1/1	997 (22%)	53,745 (94%)	S	29/81	> 10	1%	NC /---	110	25,602	
Kentucky	260	22/23/7/48	2,520 (14%)	36,125 (96%)	S*	81/96	< 5	nd	N /---	131	6,051	D
Louisiana	2236	77/6/8/9	1,276 (18%)	60,831 (91%)	E	83/85	> 10	1%	N /---	70	12,975	
Maine	203	13/46/41/0	950 (100%)	39,782 (100%)	E	93/90	5 - 10	5%	N /B,P	5	1,274	G,W
Maryland	423	11/12/9/69	595 (80%)	7,820 (100%)	S*	80/94	5 - 10	8%	N /M	188	1,249	C,P,D
Mass.	316	5/60/14/21	891 (16%)	No Data	E	89/64	< 5	5%	Y /B,P	41	382	W,P
Michigan	611	41/20/20/18	727 (100%)	No Data	S*	76/47	5 - 10	7%	Y /B,P	51	7,799	W
Minn.	787	35/23/24/18	No Data	No Data	S*	83/91	5 - 10	4%	Y /P	84	20,838	W,D
Mississippi	753	76/6/6/13	1027 (100%)	19,800 (99%)	S*	100*/96	> 10	nd	N /---	154	10,341	
Missouri	504	52/24/7/18	10,063 (100%)	No Data	S*	79/93	5 - 10	nd	Y /---	97	15,000	
Montana	6170	99/1/0/0	7,412 (95%)	33,284 (88%)	S	100/100	5 - 10	<1%	N /---	119	1,015	
Nebraska	7520	98/1/0/0	2,064 (20%)	3,150 (53%)	S*	100*/91	> 10	3%	NC /---	92	12,243	
Nevada	2622	94/4/1/1	No Data	No Data	S	40/67	> 10	0%	NC /---	231	314	
New Hamp.	76	1/25/67/7	340 (9%)	No Data	E	91/68	5 - 10	5%	NC /---	16	144	W,P
N. Jersey	279	44/40/16/0	550 (12%)	5,298 (100%)	S*	100/97	< 5	10%	Y /M,P	19	864	G,W,P,D
N. Mexico	1530	86/9/2/3	350 (100%)	458 (100%)	E	100/73	> 10	3%	Y /---	96	615	
New York	1400	4/15/15/ nd	770 (5%)	146,322 (99%)	S	95/90	5 - 10	1%	Y /M,B,P	52	5,138	W,P,D
N. Carolina	439	36/36/19/8	12,328 (100%)	9,615 (100%)	S*	100/100	> 10	<1%	NC /---	139	5,680	C,P,D
N. Dakota	209	74/10/6/11	No Data	No Data	S	67/100	> 10	nd	N /---	144	13,913	W
Ohio	396	14/28/42/16	2,568 (15%)	No Data	S*	83/91	< 5	2%	N /---	48	12,248	D
Oklahoma	579	77/11/5/8	No Data	No Data	E	95/92	5 - 10	nd	NC /---	137	15,049	
Oregon	3372	96/3/1/0	2,106 (13%)	77,900 (38%)	S*	95/100	> 10	20%	NC/M,B,P	92	1,936	G,W
Penn.	589	12/20/35/33	2,760 (12%)	No Data	S	100/93	< 5	1%	Y /M,P	49	4,285	W,P,D
Rhode Isl.	23	22/65/13/0	72 (100%)	496 (100%)	S*	77/91	5 - 10	3%	Y /M,P	48	79	G,W,P
S. Carolina	340	13/17/54/16	315 (25%)	4,050 (89%)	S*	84/97	> 10	nd	N /---	184	3,429	
S. Dakota	481	93/5/2/0	2,107 (40%)	85,189 (41%)	E	50/97	> 10	0%	NC /---	71	6,426	
Tennessee	275	12/19/68/0	1,950 (30%)	107,720 (100%)	S*	87/92	> 10	ND	NC /---	160	6,318	
Texas	9397	82/9/7/2	960 (20%)	No Data	E	90/93	> 10	6%	N /---	90	37,621	
Utah	2435	92/5/11/1	No Data	No Data	S*	69/100	> 10	nd	N /---	121	787	
Vermont	26	8/38/50/4	280 (24%)	13,443 (100%)	S*	100*/20	5 - 10	12%	Y /B,P	53	336	G,W,P
Virginia	274	16/37/27/20	3,705 (17%)	11,665 (100%)	S	96/93	< 5	1%	Y /---	143	5,032	C,D
Wash.	4739	95/2/2/0	No Data	No Data	S*	50/84	> 10	5-10%	Y /M	100	2,308	P
W. Virginia	877	3/4/18/75	8,032 (80%)	1,777 (100%)	S*	86/85	< 5	<1%	N /---	45	539	
Wisconsin	321	49/16/18/17	No Data	767,090 (100%)	S*	83/93	> 10	74%*	Y /M,P	46	9,414	W
Wyoming	4280	98/1/1/1	2,359 (100%)	51,822 (70%)	S	50/100	> 10	3%	N /---	153	349	

changes, like installing water-saving showerheads, to statewide water-use restrictions. Water depletion affects every region of the country. Major water level declines have occurred in every eastern coastal state from New Jersey to Georgia. But the problems are most severe in the arid West. The aquifers of the High Plains covering Texas, Kansas and New Mexico have been drained by more than 50 percent, and five of the fastest growing states in the nation, Colorado, Arizona, Utah, California and Nevada, rely on the Colorado River as a surface water source.[65]

Western water problems are due largely to intensive irrigation, which is often subsidized by federal water projects that provide water far below cost. One state that has addressed the issue head on is Arizona, which passed a comprehensive groundwater protection law prohibiting the development of new irrigation and restricting farming withdrawals to levels determined by a state formula. The state's goal is to have a sustainable groundwater supply by the year 2025.[66]

Water conservation is not strictly an issue concerning western agriculture. Inexpensive and unlimited water supplies across the nation may come to an end soon, as federal funding is phased out for wastewater treatment plants and new federal requirements under the Safe Drinking Water Act come into effect.

One of the leaders in water conservation is Massachusetts. By March 1989, new and retrofitted toilets in the state must flush less than 1.6 gallons of water, half the flow most toilets use today. Other states with aggressive water conservation programs include California, Minnesota and Maryland, however most action is occurring at the local level. Los Angeles, for example, recently sent water saving showerheads and toilet bags to all homes, requiring residents to certify installation or face costly surcharges on their water bills. In Denver, a conservation group has shown that an expensive and ecologically damaging dam could be avoided if the city installs water-saving devices in all homes and implements water-conserving landscape techniques.[67]

In addition to conserving water, much needs to be done to improve water quality. Although some lakes and streams have been cleaned up since the Clean Water Act passed in 1972, most states still have a thousand or more river miles and a thousand or more lake acres not meeting EPA's designated use standards. In some states, the degraded lake acres and river miles measure in the tens and hundreds of thousands, such as in Wisconsin, with 767,090 lake acres in violation, and North Carolina with 12,328 river miles failing to meet standards.[68]

States have a vital role in protecting water quality. EPA has given 25 states the authority to approve and renew permits for pollution discharges directly into surface waters and for discharges into public wastewater treatment systems. In spite of this, state inspections of permit compliance are not always adequate. Kansas only reviewed 29 percent of its permits for discharges into public wastewater treatment systems between 1987 and 1988, and California only inspected 43 percent. Likewise, Michigan only checked 47 percent of its permits for direct discharges into surface waters.[69]

MATRIX KEY

11. Total Water Consumption: 1985, in million gallons per day.

12. Water Consumption by End-Use: Percent water consumed for Agriculture/Commercial and Domestic/Industrial/Thermoelectric in 1985.

13. Water Pollution, Rivers: River miles not meeting EPA designated-use standards, 1986; and percent of state river miles assessed.

14. Water Pollution, Lakes: Lake acres not meeting EPA designated-use standards, 1986; and percent assessed.

15. Water Pollution Permitting: S= state approves permits for discharges into surface waters; *= state issues permits for discharges into publicly owned treatment systems; E= EPA administers permitting program.

16. Water Pollution Permit Inspections: 1987-88, EPA estimated percent of publicly owned treatment works inspected for compliance/ percent of major permittees polluting surface waters. *= publicly owned treatment system state run.

17. Years of Remaining Municipal Landfill Capacity (estimated statewide average).

18. Percent Municipal Solid Waste Stream Recycled: *= Wisconsin, percent includes agriculture, sewage sludge and other waste streams.

19. Waste Reduction and Recycling Programs: Y= solid waste management plan or equivalent regs.; NC= solid waste plan not current; N= no solid waste plan; M= mandatory recycling law; B= Beverage or container recycling law; P= packaging material restrictions, labeling requirements.

20. Percent Change in Urban Land Area: 1960-1980.

21. Prime Farmland: In thousands of acres, 1982. nd= no information.

22. Land-Use Protection Laws: G= state growth management law; C= excellent coastal zone management program; W= inland, or freshwater, wetland protection law; P= purchase of development; D= agriculture districting.

For sources, see page 47.

Solid waste is another area where inefficiency in managing environmental problems is extremely evident. Between 1960 and 1986 solid waste production increased by 80 percent, from 87.5 million tons to 157.7 million tons.[70] Much of this waste has been institutionalized by a "throw away" society that promotes disposability.

As the waste stream has expanded, pollution has forced many landfills to close. Some 70 percent of the landfills in operation in 1978 are closed today and new landfill construction has declined by more than 50 percent. Eight states are predicted to run out of landfill space within the next five years and 16 states will reach capacity in less than ten.

Still, an average of only ten percent of municipal waste is being recycled. Although a few states and municipalities are far ahead of the rest of the country, some analysts estimate as much as 70 percent of the waste stream can be recycled.[71]

Most extensive recycling programs are in the crowded northeast. New Jersey has mandated that all its counties recycle at least 25 percent of their waste within two years and New York plans a reduction of 50 percent by 1997. Florida, another fast growing state, recently passed a comprehensive solid waste law which puts a returnable deposit on containers made out of variety of materials, including glass, aluminum, plastic, and plastic-coated papers.

Although recycling programs are not yet the norm, savings from recycling can be substantial. The California Waste Management Board found that a curbside recycling program was $20 per ton cheaper than a program to collect and landfill the same waste. Similar conclusions have been reached about recycling in major cities such as New York, Seattle, and Minneapolis/St. Paul, and studies estimate that recycling creates 25 more jobs per 10,000 tons of trash than the equivalent landfill or waste incineration programs.[72]

Most states also lack comprehensive, long-term land-use policies. Instead a haphazard, piece-meal approach is usually taken, addressing issues individually, such as aquifer contamination, wetland filling, and the loss of valuable forest and prime farmland. Nationally, from 1960 to 1980, urban land area expanded by 22 million acres and the rural to urban conversion rate was approximately one million acres per year.[73]

Among the areas most at risk from urbanization is prime farmland. California lost 35,000 acres of "important" farmland between 1984-1986 and the fast-growing Baltimore/Washington corridor of Maryland has seen 150,000 acres disappear since 1982.[74]

Urban expansion and development pressure have had their greatest impact on coastlines.

Wisconsin has one of best farmland protection programs. The state gives farmers a generous property tax credit in exchange for a long-term farmland-use agreement. The credit is good only in counties that have developed state-approved agricultural preservation plans and exclusive agricultural use ordinances. Similar measures in other states are funded through property tax deductions which cut into local revenues. Wisconsin's tax credit, on the other hand, is funded through general state revenue.

Another effective measure is purchase of development rights (PDR) programs. Through these programs, states obtain preservation rights by paying farmers the difference between the agricultural value of the land and what a developer would pay. By the end of 1988, Maryland had protected 70,000 acres of farmland in PDRs.

Wetlands are also highly at risk from urbanization. From the mid-1950s to the early 1980s almost a million and a half acres of wetlands were converted to urban use and other developments. Until recently wetlands were considered unvaluable swamps, and were drained to construct condominiums, clear river channels, and build highways. Yet they have been recognized as aquifer recharge areas, critical to drinking water supplies. Cumulative losses of wetlands have also had a devastating impact on fish and wildlife, especially migratory birds, that rely on their habitat for survival.

Under provisions of the Clean Water Act, the Army Corp of Engineers issues permits for dredging and filling wetlands in U.S. waters and EPA has established environmental guidelines that wetland projects must meet. States also have wetland protection responsibilities. Virtually all coastal states have laws regulating activities in coastal wetlands, but only 16 states have similar measures for inland, or freshwater wetlands. New Jersey passed a law in 1988, requiring development buffer zones of up to 100 feet around wetlands of exceptional importance. Michigan's freshwater wetlands program carries with it strong penalties for non-compliance and protects a broad range of wetland types.

Urban expansion and development pressure have had their greatest impact on coastlines. From 1950 to 1985, the number of people living within 50 miles of the coast increased from 73.5 million to 125 million, more than half of the U.S. population. To help states manage increasing human demands on coastal areas, the federal government passed the

Coastal Zone Management Act in 1972. Under the law, states develop land-use plans for the "coastal zone" in exchange for federal funds. The plans must meet certain federal standards, including wetland, estuary, dune and barrier island protection.

Certain coastal zone management programs stand out above others. North Carolina maintains control over all permits for "major developments" in coastal areas of special environmental concern. The state also has strong erosion control regulations. No developments can be closer than 60 feet from the vegetation line of the shore, and in many cases they must be set further back. Maryland's law, protecting the Chesapeake Bay, is even tougher. It restricts development in the "critical area" to 1000 feet from the shoreline, and directs new building proposals to areas already intensely developed. Another excellent program is in California, which championed the "consistency" provision of the federal law, requiring that federal actions be consistent with state coastal plans. Using the provision, the state has objected to and stopped numerous proposals to develop offshore oil on the grounds it could harm the state's marine mammal population.

In some states urbanization and rapid economic development are being addressed more comprehensively through growth management laws. These give state and regional governments authority over certain local land-use decisions to address the long-term effects of growth on "quality-of-life" issues. These issues usually include transportation bottlenecks, infrastructure maintenance, affordable housing, and open space.

Oregon's law, one of the first and best in the nation, require each of the state's 278 cities and counties to adopt land-use plans consistent with state goals and policies. The program pioneered the idea of urban growth boundaries, a designated limit beyond which urban services such as sewer and water are not provided, limiting urban sprawl and protecting open space, prime farmland, and wetlands.

Only a handful of states have passed growth management laws which they have enforced. But interest is growing. In 1988 four states approved growth management legislation, including Maine, Vermont, Delaware and Rhode Island; and New Jersey and Florida enacted comprehensive measures in 1986. Florida's law requires localities to submit growth management plans by July 1, 1990, and if they fail to comply, regional commissions will do the work and bill the localities.

New efficient technologies and environmental policies are not the ultimate solutions to population and economic growth problems. But they are essential in deflating major growth pressures. They are also a pragmatic step toward ideals for sustainable systems for water and energy consumption and land-use. At their best they provide an institutional framework to support long-term change and preserve precious resources for future generations.

GROWTH AND THE ENVIRONMENT SNAPSHOT

Population growth stresses the environment, but it is only a contributing factor to our environmental crisis. Of more immediate significance is our use of inefficient technologies, our institutionalization of waste, and our failure to integrate environmental protection and resource conservation policies. The state that has addressed these concerns most comprehensively is Oregon. A key component of their growth management effort is their integrated land-use planning law, which requires localities to adopt plans consistent with state goals. These goals include the establishment of urban boundaries and the designation of zones for environmental protection and future economic growth.

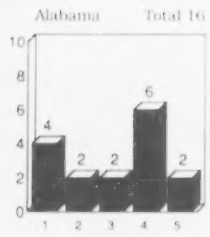
The state has also made great strides in solid waste management, in energy conservation, in water pollution control, and in air pollution control.

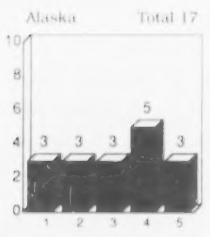
Yet, there is still much room for improvement. Oregon's highly regarded land-use planning program has met with strong resistance from many local governments and permits for develoment activities are not always enforced. Meanwhile, 68 percent of Oregon's residents live in counties failing to meet EPA's clean air standards and the state has at least 77,900 lake acres and 2,106 river miles in violation of federal clean water standards. Additionally, the state has not adopted a building code with substantial energy-efficient standards, and does not have a current statewide solid waste plan.

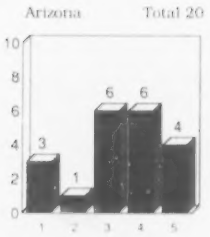
Currently:

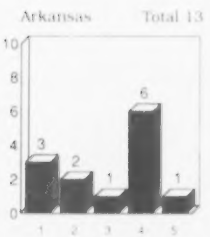
- **only nine state have passed statewide land-use planning laws;**
- **13states have comprehensive policies for integrating least-cost planning in the investment decisions of utilities;**
- **only four states have no counties in violation of EPA's clean air standards, Arkansas, Hawaii, Mississippi, and North Dakota;**
- **18 states have a statewide solid waste plan or equivalent regulations, and ten states have mandatory recycling laws;**
- **only nine states require a comprehensive under-the-hood inspection as part of their car emissions monitoring program.**

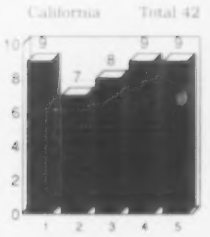
State Ranking Graphs

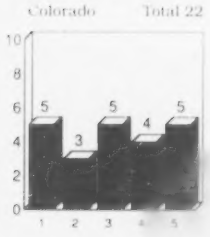


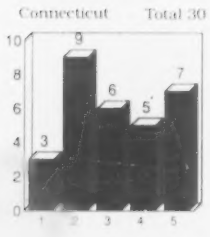


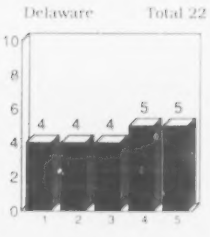


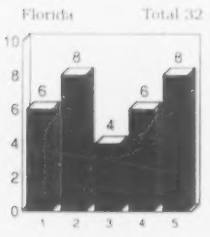


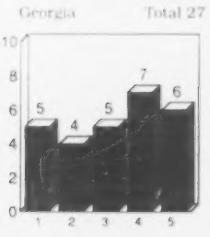


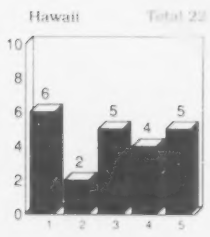


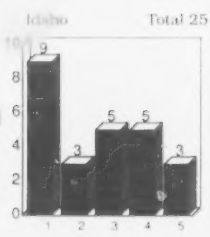


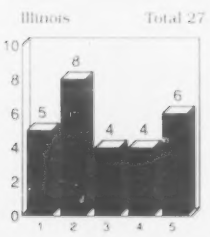


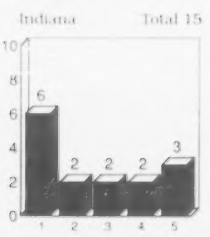


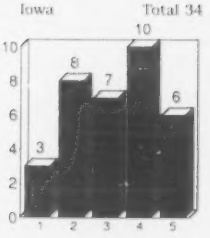


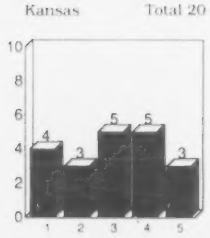


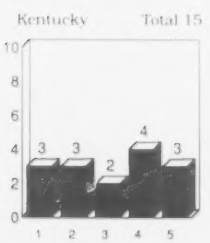


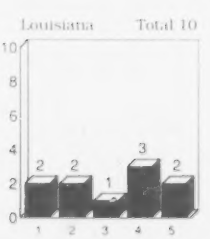


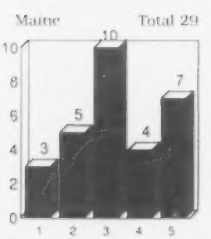


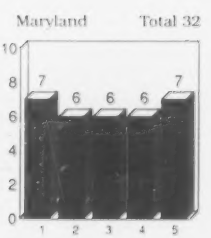


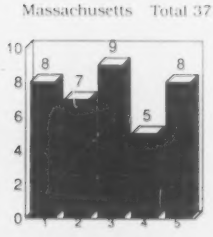


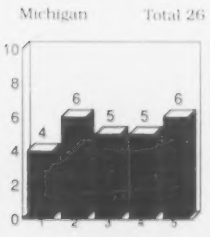


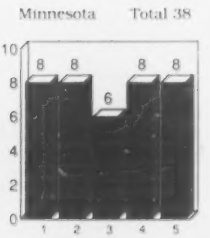


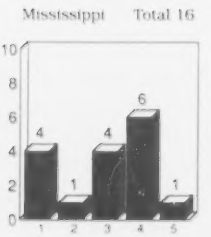


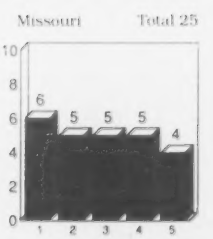






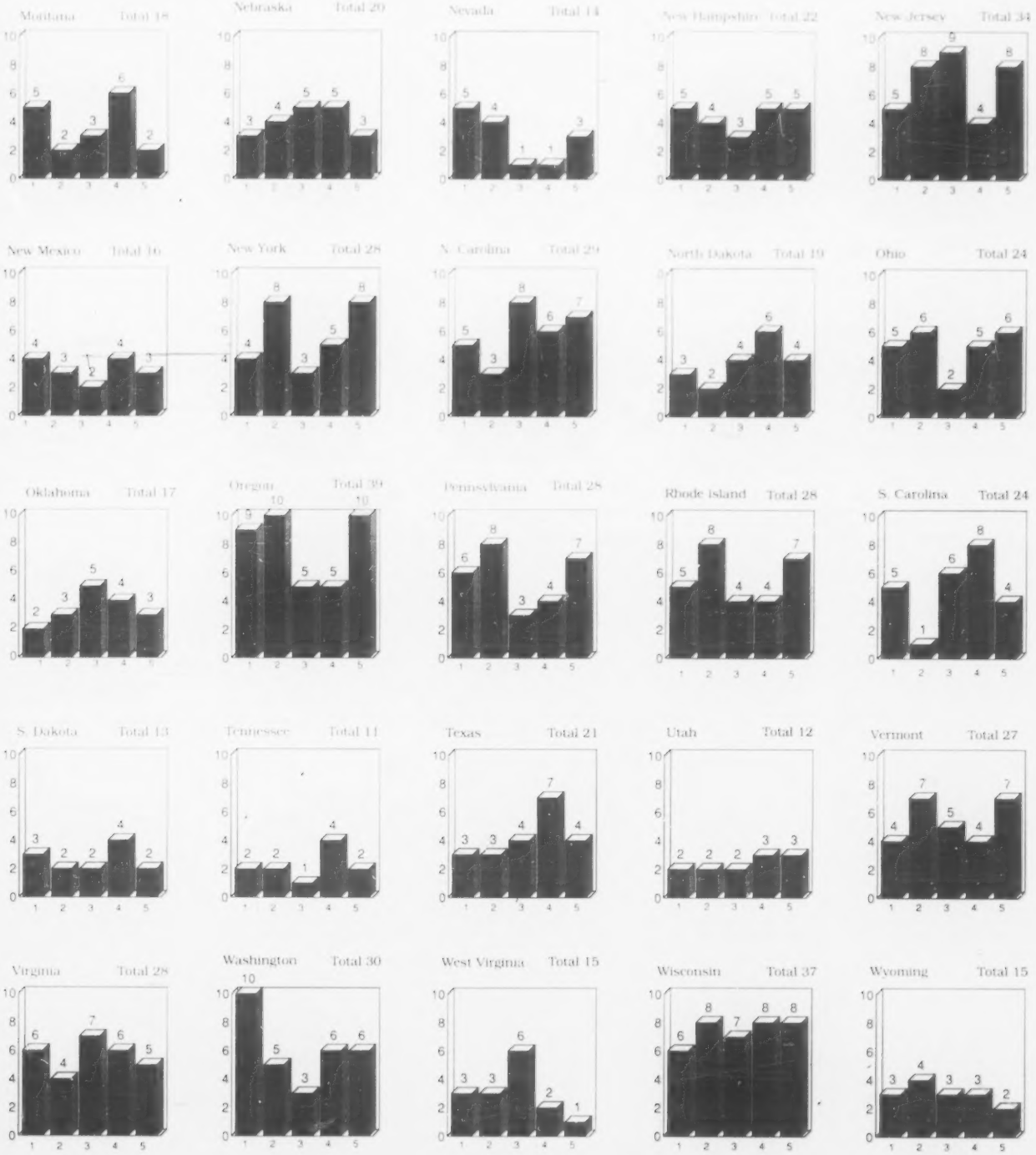






Column 1 - Forest Management
Column 2 - Solid Waste Recycling
Column 3 - Drinking Water

Column 4 - Food Safety
Column 5 - Growth and the Environment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Washington Total 30
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West Virginia Total 15
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3 4 3 3 2

Ranking Notes

States have been ranked on the strength of environmental programs and policies on a scale of one to ten. The total rank is the compilation of points for the five topics examined (potential total of 50 points). The rankings are not meant to judge particular environmental conditions in each state, but consider environmental problems as a measure of need for program strength. Key factors weighed against this need are: legislative authority for programs, scope of established programs, extent of funding, monitoring, enforcement, and indications of progress. Although programs mandated by state legislatures, rather than innovative projects, are given greater weight, attention is given to assure that states have not simply "papered-over" a problem with new legislation.

The evaluation is both comparative and subjective and is not intended to represent an absolute scale in which the top state is doing everything possible to protect the environment on a given topic. For some topics, such as solid waste recycling, recent progress is very limited despite a few bright spots. And the overall comparison must also be taken within the general stall in momentum for environmental protection.

The rankings are based on research material and data drawn from a variety of sources: individual telephone and mail surveys of the states; information filed by the states with federal agencies; studies and surveys conducted by academic institutions, private contractors, and national environmental organizations; and information from peer reviewers.

In each case, we have used what we believe to be the best data available and noted the sources in the Matrix Notes. There are still shortcomings, however. Some of the data have a generic quality because of the need to use data in which the same criteria has been applied to all states. At times the most recent data of this type are two or three years old. Another problem is that state-supplied information can have varying levels of accuracy. Where a state is obviously out of line, we have contacted state officials to verify or correct information. A more difficult problem is reluctance of government officials to supply data on enforcement, monitoring, or budgets—which leaves us with record of a program in place, but no measure of its scope or effectiveness. A final shortcoming is the absence of adequate data for all of the states on a given subtopic.

The key indicators used in the ranking are contained in the matrix pages, and in some cases sub-matrices that will be published in a more detailed Focus Paper on each topic. Readers interested in more extensive information on a particular topic, or a state ranking on that topic, should request the appropriate Focus Paper (see inside back cover for ordering information).

Forest Management

To determine the forestry rankings, both the policy and resource data in the matrix were used. Highest consideration was given to states with strong budgets and staffing relative to their forest resource and states which have passed comprehensive forest management laws. In addition, a University of Minnesota survey on state policies used to influence forest management practices on private forestland was considered. Greater weight was given to states whose response to the survey indicated that a combination of policy tools (e.g. legal regulations, technical assistance, and voluntary guidelines) was used to affect reforestation, wildlife habitat enhancement, and water quality protection. Other considerations in the rankings included state technical assistance efforts, forest recreation programs, and enforcement of forest laws and regulations.

Solid Waste Recycling

State program rankings emphasized those components identified as contributing to successful recycling efforts around the country: mandatory recycling legislation, financial assistance, and market development efforts. Where it was determined that state mandatory recycling laws have not led to active statewide recycling programs, the legislation was not considered in the ranking. States received more points for having a current solid waste management plan or comprehensive solid waste regulations than for having a draft plan underway. No credit was given for solid waste plans that are not current. Landfill bans or recycling requirements for yard or leaf waste, beverage container legislation, packaging restrictions, and government procurement legislation to stimulate the demand for secondary materials were credited. Procurement legislation that targets paper products only was given less weight than multi-material procurement laws. Whether a state provides technical assistance or public education, or has established a source reduction or packaging task force was also considered in the ranking. States were recognized for encouraging the recycling/collection of used oil, tires, industrial nonhazardous, or household hazardous waste. States that are not fully implementing mandatory used oil recycling legislation were given credit equal to states with voluntary efforts. Finally, state recycling programs were viewed within the broader context of a waste management strategy that sees incineration and landfilling as last resorts. States that have devoted substantial resources to incineration were weighed negatively. States with advanced recycling programs in the absence of a landfill crisis, as indicated by the remaining landfill capacity, were weighed positively.

Drinking Water

States were ranked on the comprehensive nature of their drinking water programs and policies. Because initial protection of water sources can greatly improve ultimate drinking water quality and reduce treatment costs, the rankings include an assessment of ground and surface water protection programs. State enforcement action against both serious and general violations of the federal Safe Drinking Water Act were used in rankings, as was the size and adequacy of state drinking water program budgets and the existence of statewide water conservation programs.

A number of states devote a large portion of drinking water resources to water system operator training and technical assistance programs. These programs are extremely important to final drinking water quality, but consistent empirical data that might

have been used to compare states in these programs was not available.

Food Safety

Five key areas were assessed in the ranking of programs capable of promoting the production and distribution of safe food: pesticides; alternatives to conventional agriculture; meat, poultry, and seafood; food additives; and residue monitoring.

Contaminated food is regarded in large measure as a symptom and conventional food production methods as one of its major causes. Therefore, considerable weight was assigned to programs which promote alternatives to conventional agriculture: sustainable agriculture programs and centers, organic labeling and farm certification, the extent of acreage influenced by integrated pest management (IPM) practices and funds spent on IPM and biological control.

The state pesticide use report was regarded as an indicator of the state's commitment to awareness of the extent of pesticide use within its borders as well as for its information value for state residue monitoring programs (i.e., as a source of information as to which pesticide residues might be contaminating which foods). Recent and more complete reports were given more weight.

Inspection and monitoring were regarded as institutional safety nets for catching contaminated food. Expenditures on programs designed to assure the safety of seafood landings were considered in proportion to the size of a state's catch. In addition, FDA's evaluation of state shellfish programs was considered. Compensation in ranking was made for states lacking fish and shellfish landings. Finally, lack of authority to test for pesticide residues weighed negatively while more varied and extensive monitoring of residues weighed favorably. Lack of food additive amendments in state laws weighed negatively.

Growth and the Environment

Rankings for growth and the environment considered six different policy areas: surface water pollution control, air pollution control, land-use planning, water conservation, energy conservation, and solid waste management. Land-use planning received greater weight due to its importance in managing growth. Water conservation received less weight due to a lack of comprehensive state-by-state data. Equal importance was given to the remaining categories.

In many of the categories, previous *State of the States* rankings were updated for this report. In land-use planning, additional consideration was given to whether growth management laws were being implemented and whether farmland protection programs were effective. In energy conservation, more weight was given to least-cost planning policies. And in air pollution control, car emission inspection programs and state emission and permit fees collections were given greater weight.

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Washington, D.C. 20460
(202) 382-5522

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USDA Office of Governmental and Public Affairs
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12th and Jefferson, S.W.
Washington, D.C. 20250
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U.S. Department of Commerce
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Thanks to all the state and local environmental groups and state agency officials who contributed their time and expertise to this report.

Sections of this report may be reproduced in magazines and newspapers with acknowledgement to Renew America. The statements and views expressed do not necessarily represent those of the sponsors, reviewers and contributors to this publication.

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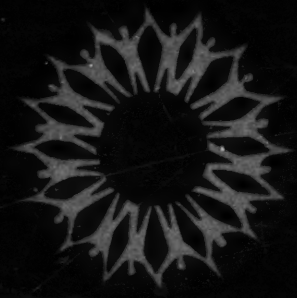

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THE STATE OF THE STATES
1989

FOREST MANAGEMENT

1

FOCUS PAPER

RENEW AMERICA

Forest Management Focus Paper

by:

Richard Magder
Renew America
February 1989

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Introduction

The Forest Management Focus Paper is a supplement to the *1989 State of the States* report. Like the main report, it includes a map, matrices, and a discussion of key forest management issues. The focus paper contains new information not found in the main report, including additional matrices on state forestry program budgets, fire management policies, and technical assistance efforts, among others. The focus paper is not intended to be a comprehensive assessment of forest management activity or the condition of forest resources in each state. Rather, it provides the best information available about key legislation and programs implemented by states for the protection and management of their forest resources.

Although forests are often overlooked by policy-makers, whose attention is more often focused on pollution and health-related environmental issues, they are a fundamental part of the ecosystem. Forests provide us with recreation, wildlife habitat, watershed protection, timber products, and cleaner air. States have management authority over most of our forest land, and play a pivotal role in protecting forest resources for future generations. This report reviews the efforts of state forestry programs, emphasizing the importance of multiple resource management. For more sources on forest management issues, see the contact list on page 21 of this report.

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STATE AND PRIVATELY OWNED FOREST LAND

Key to Reading the Map

Example: Washington - Best Overall
10 Points for Programs and Policies

21,856/60 — 21,856,000 acres of forest land/ 60% of forested land is under state jurisdiction (includes land owned by state, timber industry, and private landowners)

Points for State Programs and Policies on Forest Management

10-9	CA, ID, OR, WA
8-7	MA, MD, MN
6-5	CO, FL, GA, HI, IL, IN, MO, MT, NC, NH, NJ, NV, OH, PA, RI, SC, VA, WI
4-3	AK, AL, AR, AZ, CT, DE, IA, KS, KY, ME, MI, MS, ND, NE, NM, NY, SD, TX, VT, WV, WY
2-1	LA, OK, TN, UT

Source: Renew America 1989

FOREST MANAGEMENT

A nationwide television audience watched more than one-third of Yellowstone National Park go up in flames last summer, as the worst forest fires of the century blazed across the West. In the end the fires burned five million acres and took 50,000 firefighters and $600 million to bring under control. The devastation stunned most Americans and the prospect of a charred landscape that may take decades to restore underscored the long-term importance of forests to our ecosystem.

Forests cover one-third of the nation, providing habitat for more than 80 percent of our wildlife species and offering the setting for much of our outdoor recreation. They play a crucial role in protecting water quality by stabilizing watersheds, and reduce the rate of global warming by absorbing carbon dioxide. Forests are also home to unique ecosystems, including most wilderness areas and national parks.

At the same time forests supply the nation with one of its leading agricultural commodities —timber. In 1985, U.S. lumber and wood products sales totaled more than $54 billion, and the industry employed more than 600,000 people. In addition to providing the basic materials for the housing, furniture, and paper manufacturing industries, trees are also the source of chemicals such as turpentine, ethyl alcohol, vanillin, and synthetic resins.

Despite this significance, timber harvesting often conflicts with other uses of valuable forest resources. The roads and machines which are needed to reach trees and deliver them to mills, can disturb wildlife habitat, cause soil erosion, and destroy wilderness. Once trees are cut, reforestation is not simple or certain and full regeneration may take decades or centuries, if it occurs at all.

According to the U.S. Forest Service there has been a five percent decrease in forested area over the past 25 years due to fires, diseases, timber harvesting, and clearing of land for agriculture.[1] But aside from natural threats to forests, one of the chief man-made problems is the creation of a mono-culture by restocking with even-aged seedlings, which decreases forest diversity and disturbs the ecosystem. As a result, the timber industry is often at odds with environmentalists over how our forests should be used, and public policy-makers are sometimes caught in heated debates over production versus protection of forest areas.

One place where this conflict is being played out is in the old-growth forests of the Pacific Northwest. These ancient ecosystems contain trees seven centuries old and 250-feet high, and are said to produce more living matter than even tropical rain forests.[2] They also hold most of the remaining sawtimber in a region whose economy has relied on timber for more than a century. The timber industry believes its economic survival is imperiled if these forests cannot be harvested. Environmentalists contend that further cuts will irreparably alter the ecosystem, eliminating critical habitat for species such as the spotted owl.

The States' Role

In the Northwest and other regions of the country much valuable timber is found on land managed by the federal government. This makes federal agencies such as the Forest Service and Bureau of Land Management highly visible battlegrounds for many forest-management controversies.

Equally important is the role of states in forest land management. Approximately three-fourths of forest land that can produce commercially valuable trees is privately owned.[3] States have management authority over these lands, but to date only seven have passed forest practice acts that address a broad range of forest resources.

Most states have only minimal forestry laws and regulations, and many of these were passed more than 25 years ago to prevent federal intervention in state and private forestry. In some cases the laws were written by timber industry representatives.[4]

Federal involvement in forest management began in the late 19th century and was intensified during Teddy Roosevelt's Administration under the leadership of Gifford Pinchot. Federal assistance for state and private forestry was later established with the Clark-McNary Act of 1924, which initiated a cooperative fire control program, provided 50-50 cost-share assistance to private landowners, and introduced the idea of tax breaks to promote reforestation and sound forest-management practices.[5] These remain today as the main public-policy tools used for influencing private forest practices. In 1978, federal law was consolidated in the Cooperative Forestry Assistance Act and currently the federal Forest Service provides financial and technical assistance to state forestry programs, which in turn assist private landowners.

Forest resources vary greatly across the country and state

FOREST MANAGEMENT MAIN MATRIX

	1	2	3	4	5	6	7	8	9	10	11	12
Alabama	21,725	67%	4%	1%	21%	74%	2nd/1st	5/15/ 20		ep,ta,fi	Local (2)	ep,ta
Alaska	129,045	36%	55%	29%	7%	8%	2nd/3rd	1/35/36	LAW	lr	State (2)	None
Arizona	19,384	27%	79%	12%	0%	9%	9th/10th	38/48/46		ep,ta	Local (2)	ep,ta
Arkansas	16,987	51%	16%	2%	25%	57%	2nd/2nd	13/25/19		ta	Local (2)	ep,ta
California	39,381	39%	50%	1%	12%	37%	9th/7th	2/2/2	LAW	fi,ep,ta,vg,lr	Local (5)	ep,ta,vg,fi,lr
Colorado	21,338	32%	69%	2%	0%	28%	10th/10th	29/22/26		ep,ta	Local (2)	ep,ta
Connecticut	1,815	59%	1%	11%	0%	86%	10th/10th	41/45/40		ep,ta	None(2)	ep,ta
Delaware	398	33%	14%	6%	8%	73%	3rd/3rd	50/50/50		ti,ta	None(0)	None
Florida	16,549	48%	10%	5%	33%	50%	6th/6th	12/8/ 6		ep,ta,ti,fi	Local (0)	ep,ta,vg,lr
Georgia	23,907	65%	6%	<1%	21%	73%	3rd/4th	4/4/ 12		ep,ta,vg,fi	Local (2)	ep,ta,vg
Hawaii	1,748	43%	1%	43%	31%	21%	5th/5th	42/32/41	REG	fi,ta	None(0)	ta,lr
Idaho	21,818	41%	77%	6%	6%	9%	2nd/2nd	32/20/13	LAW	ep,ta,vg,ti,lr	State (4)	ep,ta,vg,lr
Illinois	4,265	12%	7%	3%	<1%	89%	10th/10th	36/27/31		ta,ti,fi	Local (1)	ta,ti,fi
Indiana	4,439	19%	8%	7%	10%	76%	8th/10th	35/17/21		ep,ta,fi	Local (2)	ep,ta,ti,llr
Iowa	1,562	4%	3%	3%	1%	92%	7th/9th	44/38/41		ep,ta,ti,fi	None(0)	ep,ta,fi
Kansas	1,358	3%	4%	1%	0%	95%	9th/9th	45/44/49		ta, ep	None (0)	fi, ep, ta
Kentucky	12,256	48%	8%	1%	2%	90%	9th/10th	21/28/28		ep,ta,ti,fi	Local (2)	ep,ta
Louisiana	13,883	49%	6%	2%	31%	60%	3rd/4th	18/33/30		ep,ti,fi	Local (0)	ep
Maine	17,713	90%	<1%	<1%	47%	49%	1st/1st	7/29/ 9	REG	ep,ta	State (3)	ep,ta
Maryland	2,632	42%	1%	7%	5%	85%	6th/9th	39/23/28		ta,ti,fi,lr	Local (4)	ep,ta,fi,ti
Massachusetts	3,097	62%	<1%	13%	2%	85%	9th/9th	37/14/37	LAW	ep,ta,ti,lr	Local (4)	ep
Michigan	18,220	50%	14%	20%	11%	53%	8th/7th	10/13/ 15		ep,ta,vg,ti,fi	Local (3)	ep,ta,fi
Minnesota	16,583	33%	21%	22%	5%	35%	6th/3rd	17/7/5		ep,ta,ti,fi	Local (4)	ep,ta,fi,ti
Mississippi	16,693	55%	9%	2%	20%	65%	2nd/1st	11/10/ 08		ep,ta,fi	Local (0)	ep,ta,vg
Missouri	12,523	28%	10%	5%	2%	79%	9th/8th	23/16/21		ep,ta,vg,ti,fi	None(2)	ep,ta
Montana	21,910	24%	73%	3%	7%	16%	1st/2nd	31/24/17		ep,ta,ti,fi	Local (3)	ep,ta
Nebraska	722	1%	6%	6%	0%	88%	9th/11th	46/41/43		ep,ta	None(0)	ep,ta,fi
Nevada	8,928	13%	*45%	*4%	*6%	*45%	No Data	26/47/43	LAW	ta,lr	Local (3)	vg,ta
New Hampshire	5,021	88%	10%	3%	14%	72%	3rd/3rd	33/34/38		ep,ta	Local (4)	ep,ta
New Jersey	1,985	43%	2%	13%	1%	82%	9th/9th	40/37/23		ep,ta,fi	Local (3)	ta,lr
New Mexico	18,526	24%	49%	5%	0%	46%	7th/8th	25/43/35	REG	ta,vg,lr	Local (2)	ta
New York	18,775	62%	1%	21%	11%	66%	10th/11th	6/11/ 10		ta,ti,fi	Local (2)	ta
North Carolina	18,891	61%	10%	2%	13%	74%	5th/7th	8/9/ 13		ep,ta,vg,ti,fi	State (3)	ep,ta
North Dakota	460	1%	15%	6%	0%	78%	7th/7th	49/46/47		ta	None(1)	None
Ohio	7,397	28%	2%	3%	6%	87%	9th/10th	28/21/16		ep,ta,vg,ti	Local (2)	ep,ta,vg
Oklahoma	8,971	20%	10%	2%	22%	66%	10th/10th	27/39/32		ep,ta	Local (1)	ta
Oregon	28,055	46%	58%	3%	21%	16%	1st/1st	20/3/3	LAW	lr	State (3)	ta
Pennsylvania	16,997	59%	3%	20%	6%	69%	8th/8th	9/5/ 7		ep,ta	Local (3)	ep,ta
Rhode Island	399	60%	0%	12%	0%	85%	9th/11th	48/36/34		ta	None(2)	ta
South Carolina	12,257	64%	7%	1%	18%	73%	4th/3rd	22/18/18		ep,ta,vg,fi	Local (1)	ep,ta,vg
South Dakota	1,690	3%	74%	5%	4%	16%	5th/4th	47/40/38		ta,fi	Local (0)	None
Tennessee	13,258	50%	6%	2%	9%	81%	8th/6th	19/26/26		ep,ta,vg	Local (2)	ta
Texas	23,330	14%	6%	<1%	33%	60%	8th/8th	3/19/ 25		ep,ta,fi	---- (0)	None
Utah	16,234	31%	69%	10%	0%	17%	9th/10th	30/49/45		ta,ti,fi	Local (1)	ta
Vermont	4,479	76%	7%	6%	8%	78%	2nd/2nd	34/30/32		ep,ta,fi	State (3)	None
Virginia	15,968	63%	11%	1%	12%	73%	3rd/6th	14/12/10	REG	ep,ta,fi,lr	Local (2)	ep,ta,vg
Washington	21,856	51%	*39%	*10%	*25%	*25%	2nd/2nd	16/1/1	LAW	ta,lr	State (4)	ta
West Virginia	11,942	78%	8%	2%	8%	82%	5th/7th	24/31/23		ep,ta	Local (2)	ep,ta
Wisconsin	15,319	44%	11%	5%	8%	60%	2nd/3rd	15/6/4		ep,ta,ti,fi	Local (2)	ep,ta
Wyoming	9,966	16%	86%	2%	1%	11%	No Data	43/42/48		ep,ta	Local (0)	ep,ta

forestry programs reflect these differences. In the Pacific Northwest, vast coniferous forests dominate the landscape and states must take into account unique ecosystems such as the old-growth forests, a prosperous forest products industry, large federal landholdings, and the potential of massive forest fires. In most eastern states, forests are smaller and stocked with less commercially valuable trees, so these states emphasize non-industrial management and assistance to landowners such as farmers.

A different situation exists in the South, where soil conditions and climate conducive to growing valuable trees have attracted a large and fast-growing timber industry. In 1985, Alabama and Mississippi ranked lumber and paper manufacturing second in employment and first in output, and in Georgia and Louisiana they were third and fourth, respectively. Recent trends indicate that the timber industry is shifting its operations to the South due to declining availability of timber in the Pacific Northwest.[6]

A few states own and manage a significant amount of forest land themselves, either in state parks or state forests. Most of these are in the Northeast and Midwest, where tourism associated with forest recreation provides substantial income to local communities. Minnesota, for example, owns 22 percent of its forest land, New York 21 percent, and Michigan and Pennsylvania 20 percent.

States spend most of their forestry effort on fire control, which on average accounts for 60 percent of program funding.[7] The seriousness of fire problems depends on geography and annual climate conditions, making comparisons of state fire-management efforts difficult. Aside from fire control, essential state program areas that affect long-term forest management include non-fire forestry budgets and staffs, forestry laws and regulations, financial and tax assistance to private land owners, and forest-resource planning.

Ultimately, what can be achieved with state programs relies heavily on budget considerations. State forestry program budgets in recent years have declined in real dollar terms due to cutbacks in federal spending. However, some states have been able to maintain spending levels by offsetting the lost federal share with increased revenue from timber sales, seedling prices, technical assistance and fire service charges.[8]

Comparisons of forestry budgets and staffs (excluding fire management) show some states doing much better than others. Washington, for example, ranked sixteenth nationally in total state and private forest land, but first overall in both budget and staff in 1988. Likewise, Oregon ranked twentieth in state and private forest land, but third in budget and staff. Other states with strong budgets and staffs include Minnesota, Wisconsin, Idaho, Maryland, Rhode Island, Massachusetts, and Indiana. Among the states with the lowest funding relative to their forest resource were Alaska, Alabama, Maine, Louisiana, Texas, Nevada, and New Mexico.

Comprehensive Laws

Seven states have enacted laws that attempt to balance a wide range of forest values that include timber production, wildlife, water quality, forest

FOREST MANAGEMENT MATRIX NOTES

1. Total Forest Land: Thousands of acres (1987).

2. Land Area Covered by Forests: As percent of state's total land area.

3-6. Forest Land Ownership: percent of state's forest land owned by: federal government (column 3), state government (column 4), timber industry (column 5), and other private landowners (column 6). * = percentages are based on commercial forest acreage (land capable of producing commercial timber).

7. Timber Industry Rank: In terms of employment/dollar value. Ranking done in comparison with other manufacturing industries in each state (1985).

8. Forestry Program Budgets and Staffs: Rank of state in amount of forest land under its jurisdiction/rank of state forestry program budget (excluding fire expenditures)/and rank of program staff in number of managerial and professional employees (1987-1988).

9. Forestry Laws: Law= states with comprehensive, modern forest practice laws, Reg= states with significant forest practice regulations (1986).

10. Reforestation Policies: State response to survey on policies to promote reforestation on private forest land. ep= educational program, vg= voluntary guidelines, fi= financial incentive, ti= tax incentive, lr= legal regulation, ta= technical assistance (1985).

11. Water Quality: State's responses to survey on water quality problems due to forest practices. State= more than 50% of state waters degraded, Local= less than 50%, None= no significant degradation. In parentheses, evaluation of forest–practice water quality protection policies (from 5= highest score, to 0= lowest).

12. Wildlife Habitat: State's response to survey on policies to protect wildlife habitat on private forest land. (Abbreviations same as column 10.)

For sources, see page 20.

diversity, recreation, and aesthetics. They are Alaska, Washington, Oregon, California, Idaho, Nevada, and Massachusetts.

In general, these comprehensive laws set up a state Board of Forestry to promulgate rules governing forest practices on private land. Timber owners are required to file plans and receive approval before commencing harvests. They must also meet specified levels of regeneration after harvest, mitigate damage to wildlife habitat, soils, and water quality, and protect aesthetic appearance. The lead enforcement role for these laws is usually assigned to the state forestry programs, giving them the power to issue stop-work orders or seek criminal or civil penalties through the courts against violators. With the exception of Massachusetts, the forestry agencies are also authorized to repair damages to forest resources when violators fail to pay for it themselves.9

Among the seven laws, California's is widely regarded as the most comprehensive. California requires licensing of all timber operators and imposes strict limitations on timberland conversions. The state also gives the public the right to comment on any harvesting plan and receive a written response before the plan is approved. Additionally, any county with approved regulations can request a hearing on a harvesting plan or appeal a plan's approval.10

Although California's law is highly regarded, its implementation has been controversial. Environmentalists believe the forestry agency approves plans with only minimal consideration for non-timber values. Environmental groups have filed several lawsuits, which contend that the Board of Forestry has not adequately addressed the cumulative impacts of logging and forest roads on old-growth forests, wildlife areas, and critical watersheds.11

One state that has reached a compromise among its diverse forest constituencies is Washington. In 1987 the state's timber industry, environmentalists, natural resource agencies and Indian tribes were brought together through a unique mediation process. The resulting document—the Timber, Fish and Wildlife Agreement—was approved by the Board of Forestry, and superseded the forest practice rules then in place. Among its innovative actions was the creation of interdisciplinary teams to make on-site reviews of forest practices, the reorganization of the Department of Natural Resources to improve enforcement, and the doubling of time for harvest application review.

Studies from the early 1980s show that states that have passed forestry practice acts have had high levels of reforestation. In Oregon, for example, reforestation requirements were met 95 percent of the time, resulting in 30-40 percent more reforestation since the state's law was passed. In California reforestation requirements were met 99 percent of the time, and 25 percent more reforestation occurred following passage of its Act.12

Despite these successes, none of the seven states strictly enforces its forestry law, preferring to rely on landowner cooperation rather than formal sanctions against violators. Through 1985, Massachusetts had not imposed any fines or revoked any timber licenses, and Alaska reported only three or four sanctions a year, with full prosecution of only two cases. Likewise, Idaho cited only 11 sanctions against 378 operations considered unsatisfactory from 1981-1984.13 While lack of funding and staff are often cited as the cause of poor enforcement programs, Oregon has imposed a Forest Products Harvest Tax which directly increases regulatory revenue with increases in timber harvests.

Economic Incentives

Instead of regulation, most states rely on policies such as financial and tax incentives to influence private forestry practices. Although these policies often promote reforestation, they generally do not have a strong effect on non-timber management issues. The main source of financial assistance is the federal government, which provides cost-share assistance to private forest land owners through the federal Forestry Incentive Program (FIP) and Agricultural Conservation Program.

Another federal financial assistance program that has led to substantial reforestation is the recently passed Conservation Reserve. It pays farmers to stop planting crops on highly erodible land for at least ten years, and return it to a soil-conserving use such as trees or grasses. Although the program has fallen short of its original tree-planting goal, it accounted for one million acres of reforestation in 1987. Most of this is taking place in the South, however, where landowners can grow commercially valuable timber species.

A few states provide their own cost-share dollars, which have become more important in recent years due to declining federal expenditures. Among these is Virginia, whose reforestation program is modeled after FIP, and Illinois, which provides financial assistance to landowners who have an approved forest-management plan. Also, California has a generous program, funded by state timber sales, which provides landowners with up to 75 percent of the funds for reforestation, wildlife habitat enhancement, and land conservation.

There are many tax breaks for owners of private forest land, mainly to address the risks of timber production's long-term investment. Historically, the federal tax code contained a num-

ber of these, such as a ten-percent tax credit for up to $10,000 of annual reforestation expenses. However, the tax reform law of 1986 eliminated many benefits, including preferential capital gains rates.[14]

State tax benefits are often in the form of lower rates on agricultural land. Wisconsin has one of the more innovative programs, which reduces property taxes if a landowner agrees to a long-term timber-management contract with the Department of Natural Resources. A few states provide tax benefits for non-timber purposes, such as New Hampshire, which lowers rates on land opened for recreation, and Indiana, which taxes land managed for wildlife at only $1 per acre. Likewise, Louisiana relieves landowners of all property taxes in exchange for a 25-year lease on the land for wildlife management.

State Planning Efforts

A new and promising area in state forestry is forest-resource planning. At its best, planning can balance the management concerns of all forest users and can establish a management framework for protecting all forest resources. Most states initiated planning programs in 1978, following passage of the Cooperative Forestry Assistance Act, which provided federal funds and technical assistance for that purpose. Currently, only West Virginia does not have a planning program, and only Alaska, Arizona, Connecticut, New Mexico, and Tennessee have not completed their plans. Kentucky has completed a draft plan, but has not released it.[15]

While it is currently difficult to assess state planning efforts, key areas to consider include whether the state plan is based on a forest resource inventory, is linked to the state's budget process, provides for a high degree of public involvement, and gives equal consideration to non-timber values. Planning has led to better cooperation among user groups in some states and played a major role in the creation of two regional forestry coalitions: The Lake States Forestry Alliance (Michigan, Minnesota and Wisconsin) and The Northeastern Forest Alliance (Maine, New Hampshire, New York, and Vermont).

It appears that states will have an increasingly important role in managing our forest land. With timber harvesting on federal lands in decline, such as in the Northwest, more pressure will be placed on private forest lands under state jurisdiction. While it is difficult to protect against natural disasters, we can stop man-made disasters and destruction of forest ecosystems. But while states have authority over 73 percent of commercial forest land, few have enacted comprehensive forestry laws. The challenge for states is to move more swiftly to ensure the long-term sustainability and diversity of the forest ecosystem for its wildlife, watershed protection, recreational, and timber values.

FOREST MANAGEMENT SNAPSHOT

Washington has one of the most effective forestry programs in the nation. This assessment is based mainly on the consideration of a cooperative agreement reached in 1987 among the state's environmentalists, timber producers, state agencies, and Indian tribes. Known as the Timber, Fish and Wildlife Agreement, it may set the standard for multiple forest resource management.

The Agreement focuses on implementation of Washington's forest practice law, which has been in place since 1974 but has been highly controversial. It lengthens the time for reviewing most forest practice applications from 14 to 30 days to allow time for considering comments from all parties. It allows applicants to propose site-specific plans, which may vary from regulations if they can show that the plan will result in equal or greater resource protection. And it identifies priority areas, such as critical wildlife habitat and unstable watersheds, on which forest practices may be reviewed by an interdisciplinary team.

Currently:

- seven states have comprehensive forest management laws;
- ten states have legal regulations requiring reforestation following harvest, although 30 states use some form of tax relief or financial incentive;
- seven states have identified forest practices as a major contributor to water quality problems, and of those only two are taking aggressive action to minimize impacts.

The Final Scores

	Percent of Possible Points	*Total Points (out of 50)*	*Rank*	***Forest Mgmt. Points***
California	84	42	1	9
Oregon	78	39	2	9
Minnesota	76	38	3	8
Massachusetts	74	37	4	8
Wisconsin	74	37		6
Iowa	68	34	6	3
New Jersey	68	34		5
Florida	64	32	8	6
Maryland	64	32		7
Connecticut	60	30	10	3
Washington	**60**	**30**		**10***
Maine	58	29	12	3
North Carolina	58	29		5
New York	56	28	14	4
Pennsylvania	56	28		6
Rhode Island	56	28		5
Virginia	56	28		6
Georgia	54	27	18	5
Illinois	54	27		5
Vermont	54	27		4
Michigan	52	26	21	4
Idaho	50	25	22	9
Missouri	50	25		6
Ohio	48	24	24	5
South Carolina	48	24		5
Colorado	44	22	26	5
Delaware	44	22		4
Hawaii	44	22		6
New Hampshire	44	22		5
Texas	42	21	30	3
Arizona	40	20	31	3
Kansas	40	20		4
Nebraska	40	20		3
North Dakota	38	19	34	3
Montana	36	18	35	5
Alaska	34	17	36	3
Oklahoma	34	17		2
Alabama	32	16	38	4
Mississippi	32	16		4
New Mexico	32	16		4
Indiana	30	15	41	6
Kentucky	30	15		3
West Virginia	30	15		3
Wyoming	30	15		3
Nevada	28	14	45	5
Arkansas	26	13	46	3
South Dakota	26	13		3
Utah	24	12	48	2
Tennessee	22	11	49	2
Louisiana	20	10	50	2

Key:

Forest Management Points are based on a scale of 1 to 10. The points were derived from the data in the matrices and measure the strength of state programs and policies to protect the environment. See "Ranking Notes" on page 9 for detailed explanation.

Total Points consist of a maximum score of 50 points. Each of the five topics in the 1989 main report have a maximum value of 10 points. (The five topics are: Forest Management, Drinking Water, Solid Waste Recycling, Food Safety, and Growth and the Environment.) The point values for each topic are added together to give the state's total point score.

Percent of Possible Points indicates each state's total points as a percentage of the total possible points.

Overall Ranking is the ranking of the states based on the total points received for all five topics. In the case of a tie each state is given the same ranking. Example: Both Maine and North Carolina received 29 points and tied for 12th place.

Summary Example: With 25 points, Idaho ranks 22nd in the nation for the strength of state environmental programs examined. For forest management, Idaho received nine points on a 10 point scale. The nine points received for forest management were added together with the points received for the remaining four topics to equal the total point score of 25.

* **Washington** was judged to have the strongest programs and policies for forest management and received 10 points (see Forest Management Snapshot).

Ranking Notes

States have been ranked on the strength of environmental programs and policies on a scale of one to ten. The total rank is the compilation of points for the five topics examined (potential total of 50 points). The rankings are not meant to judge particular environmental conditions in each state, but consider environmental problems as a measure of need for program strength. Key factors weighed against this need are: legislative authority for programs, scope of established programs, extent of funding, monitoring, enforcement, and indications of progress. Although programs mandated by state legislatures, rather than innovative projects, are given greater weight, attention is given to assure that states have not simply "papered-over" a problem with new legislation.

The evaluation is both comparative and subjective and is not intended to represent an absolute scale in which the top state is doing everything possible to protect the environment on a given topic. For some topics, such as solid waste recycling, recent progress is very limited despite a few bright spots. And the overall comparison must also be taken within the general stall in momentum for environmental protection.

The rankings are based on research material and data drawn from a variety of sources: individual telephone and mail surveys of the states; information filed by the states with federal agencies; studies and surveys conducted by academic institutions, private contractors, and national environmental organizations; and information from peer reviewers.

In each case, we have used what we believe to be the best data available and noted the sources in the Matrix Notes. There are still shortcomings, however. Some of the data have a generic quality because of the need to use data in which the same criteria has been applied to all states. At times the most recent data of this type are two or three years old. Another problem is that state-supplied information can have varying levels of accuracy. Where a state is obviously out of line, we have contacted state officials to verify or correct information. A more difficult problem is reluctance of government officials to supply data on enforcement, monitoring, or budgets—which leaves us with record of a program in place, but no measure of its scope or effectiveness. A final shortcoming is the absence of adequate data for all of the states on a given subtopic.

The key indicators used in the ranking are contained in the matrix pages, and in some cases sub-matrices that will be published in a more detailed Focus Paper on each topic. Readers interested in more extensive information on a particular topic, or a state ranking on that topic, should request the appropriate Focus Paper (see inside back cover for ordering information).

Forest Management

To determine the forestry rankings, both the policy and resource data in the matrix were used. Highest consideration was given to states with strong budgets and staffing relative to their forest resource and states which have passed comprehensive forest management laws. In addition, a University of Minnesota survey on state policies used to influence forest management practices on private forestland was considered. Greater weight was given to states whose response to the survey indicated that a combination of policy tools (e.g. legal regulations, technical assistance, and voluntary guidelines) was used to affect reforestation, wildlife habitat enhancement, and water quality protection. Other considerations in the rankings included state technical assistance efforts, forest recreation programs, and enforcement of forest laws and regulations.

Text Notes

Forest Management

1. U. S. Dept. of Agriculture Forest Service, *An Analysis of the Timber Situation in the U.S, 1989-2040 (Draft),* and, *Timber Statistics, 1963,* Total Forestland Tables, Appendix pp. C-5 and 141 respectively.

2. The Wilderness Society, *Ancient Forests: A Threatened Heritage,* Washington, D.C. 1988.

3. USDA Forest Service, *Report of the Forest Service, 1987,* 1988, p.42.

4. Paul Ellefson and Russell Henly, *State Forest Practice Regulation in the U.S.: Administration, Cost, and Accomplishment,* University of Minnesota, Agricultural Experiment Station Bulletin AD-SB-3011, 1986, p.2.

5. Roger D. Silvestro, (ed.), *The National Audubon Society Wildlife Report, 1986,* The National Audubon Society, New York, p. 153.

6. Ibid., p. 146.

7. Frederick Cubbage, et al., *Trends in State and Federal Funding for State Forestry Programs,* University of Georgia, College of Agriculture Experiment Stations, 1988, p. 33.

8. Ibid., p.51

9. Ellefson and Henly, pp. 1-3.

10. Ibid., pp. 90-92.

11. Andy Alm, "Lawsuits Question Adequacy of California's Forest Practice Rules," *Forest Watch* , December 1987.

12. Paul Ellefson, et. al.,"State Regulation of Private Forest Practices: What Accomplishments at What Costs?," *Western Wildlands*, Winter 1988, p. 24.

13. Ibid., p.25.

14. Kaid Benfield, et al.,*Taxing the Tree Farm: Sensible Policies for Sensible Forestry,* Natural Resources Defense Council, Washington, D.C., 1988, p.15.

15. U.S. Forest Service, Cooperative Forestry Division, staff interview, August 1988.

Forestry Program Budget Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13
Alabama	11,834	526	1,150	124	941	35	291	550	1,600		2,055	19,105	5,019
Alaska	16,335	1,492	274	20		18			61			18,200	301
Arizona	490	90	272	4	45	40	12	12	70			1,035	935
Arkansas	6,183	247	1,993	48	419	79	120	723	488		74	10,374	1,116
California	307,889	1,563	50	252	3,151	24	17	24	986	10	16,370	330,336	4,451
Colorado	3,341	3	572	43	544	3,182	18	22	219		32	7,976	529
Connecticut	1,311	719	65					4	100			2,199	1,020
Delaware	130	65	95	12	15	18	14	2	4			355	705
Florida	24,226	5,161	2,006	55	226	519		180	1,901		4,242	38,516	7,008
Georgia	27,883	307	4,141	66	368	380	58	1,092	7,077		6,520	47,892	4,503
Hawaii	874	1,315	125	10	94	50			380	340		3,188	241
Idaho	6,525	4,730	483		286	15	17	17			68	12,141	17,200
Illinois	205	40	897	100	10	75	50	90	970		850	3,287	739
Indiana	893	96	707	141	39	19	66	143	841	3,389	1,372	7,705	2,595
Iowa	208	432	402	41	55	12		46	506			1,702	300
Kansas	190		237		20	93	83	6	367		121	1,118	344
Kentucky	5,052	79	1,300	236				157	993		39	7,856	968
Louisiana*	8,700	*2,174										10,874	0
Maine	6,579	1,100	460	40	744	15	60	65	200	9	10	9,282	300
Maryland*	1,296	1,000	2,275	200		450			300			5,521	1,306
Massachusetts	2,000	682	553	60	510	110	25	16		*20000		*24136	6,640
Michigan	6,775	7,819	510	87	179	8		33	218	1,355		16,984	6,485
Minnesota	5,381	8,278	1,073	264	162	64	21		2,241	249	5,188	22,920	6,137
Mississippi	7,397	26	4,959	110	265	46	58	276	2,543		5,285	20,965	3,587
Missouri	2,500	2,200	2,100	450	150	625	30	40	800	250	330	9,475	1,064
Montana	3,473	1,989	169	36	40		29	16	204		1,734	7,690	2,656
Nebraska	485		126	15	40	110	25	3	603		75	1,482	495
Nevada	5,000		300		70	20			232			5,622	258
New Hampshire	734	569	545	75	105	170	18	18	133		353	2,720	360
New Jersey	3,680	368	62	67	106	26	2		208		665	5,184	145
New Mexico	1,056		569		33	34	25				289	2,006	0
New York	3,000	2,310	2,415	397	124	210	90	242	608	6,900		16,296	8,680
North Carolina	12,949	428	5,777	111	480	207	147	467	2,129	437	3,573	26,706	3,516
North Dakota	320	16	218	15	34	34	10	4	293	12		956	206
Ohio*	1,812	3,061	826	52	68	254	5		885			*6933	2,341
Oklahoma	3,364		406	2	39	60	67	19	582		186	4,724	400
Oregon	19,122	10,974	1,064	244	395	23	23	236	2,134		835	40,948	26,147
Pennsylvania	3,537	10,687	1,155		4,921		1		649		2,312	23,262	7,764
Rhode Island	225	650	110	4	30	50		4		650	260	1,983	77
South Carolina	10,794	620	2,292	55	225	125	33	387	2,310		500	17,341	1,314
South Dakota	603		328		48	27	5	12	373		466	1,862	557
Tennessee	8,018	900	1,135	52	161	48			930		757	12,001	511
Texas	5,638	50	2,872	252	447	83			749		1,778	11,869	1,300
Utah	891	84	89	15	3	34			148		33	1,296	195
Vermont	275	620	625	125	310	5	30	10	125		617	2,742	526
Virginia	6,454	550	7,754	115	247	140	68	270	1,520		117	17,235	5,805
Washington	8,489	*19515	299		206	55		114	1,372	1,196	11,624	42,870	140,013
West Virginia	1,140	68	845	153			95		376		880	3,557	486
Wisconsin	7,744	1,873	5,716	193	283	10		306	1,456	4,649	4,500	26,730	4,444
Wyoming	3,915	392	343	7	227		16					4,899	69

FORESTRY PROGRAM BUDGET
MATRIX NOTES

State forestry program budgets (in thousands) by line item 1988. (*1987 in Ohio, Maryland, and Louisiana)

Column 1 — Fire Management.

Column 2 — State Forests. *Louisiana— amount includes funds for all other line items in the budget; state did not indicate how funds were distributed. *Washington— amount includes funds for activities on non-forested, state-owned lands.

Column 3 — Cooperative Forestry (In most states, includes funds for state technical assistance programs to private landowners).

Column 4 — Utilization and Marketing (Includes funds for promoting state timber products, through education, market surveys, and workshops).

Column 5 — Forest Insect and Disease Management.

Column 6 — Urban and Community Forestry.

Column 7 — Resource Conservation and Development (Federal funds funneled to state forestry programs through the Soil Conservation Service for special projects such as protecting federally designated watersheds through tree planting).

Column 8 — Agricultural Stabilization and Conservation Service Programs (Federal funds provided to state forestry programs to assist private landowners).

Column 9 — Nursery Programs.

Column 10 — Forest Recreation. *Massachusetts— amount includes funds for state parks; only about $8,000 was actually spent on forest recreation.

Column 11 —Other (Unspecified spending).

Column 12 — Total Expenditures. *Due to accounting errors by Massachusetts and Ohio, the sum of the columns above does not add exactly to the total listed in this column. In other states, the total may be off slightly due to rounding.

Column 13 — Revenue generated by state forestry programs through timber sales, permits fees, and service charges.

Caution should be used in interpreting this matrix, because line items may be defined differently from state to state. In general, federal appropriations represent less than 10% of total forestry program budgets.

Source: The National Association of State Foresters,"1988 and 1987 State Forestry Statistics Reports," and staff interviews with state forestry departments, July-December 1988.

Forest Practice Matrix

	1	2	3	4	5	6	7	8	9
Alabama	ta, vg	fi,ep,ta,vg	vg	vg	vg	ep,ta	ep,ta	ta	fi,ep,ta
Alaska	lr	lr	lr	lr	lr	ep,ta	ep,ta		lr
Arizona	ep, ta	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta,lr
Arkansas	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ta	ta		ep,ta,lr
California	fi,ep,ta,vg,lr	fi,ep,ta,vg,lr	fi,ep,ta,vg,lr	fi,ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg,lr	ta,lr	
Colorado	ep,ta	ep,ta,vg	ep,ta,vg	ta	ta	ep,ta	ep,ta		ep,ta,lr
Connecticut	ep,ta,vg	ep,ta	ep,ta,vg	ep,ta	ep,ta	ep,ta	ta	ep,ta	lr
Delaware		ta							
Florida	vg	vg	vg	vg	vg	vg	vg	vg	ep,lr
Georgia	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg		vg	ep,ta,lr
Hawaii	lr								lr
Idaho	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg,lr
Illinois	ta	ta	ta	ta	ta	ta		ta	ta
Indiana	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta,lr
Iowa	ta	ta				ep,ta	ep,ta		ep,ta,lr
Kansas		ta							
Kentucky	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta			ta,lr
Louisiana	ep,vg	ep,vg	ep			ep	ep	ep	lr
Maine	ep,ta	ep,ta,lr	ep,lr	ep,lr	ep,ta	ep,ta			ep,ta,lr
Maryland	ta,lr	ep,ta,lr	ta,lr	ep,ta,lr	ta,lr	ep,ta	ta	ta	ta,lr
Massachusetts	ep,ta,lr	ep,ta,lr	ep,ta,lr	ep,ta,lr	ep,ta,lr	ti,ep,ta,lr	lr	ep,ta,lr	lr
Michigan	ep,vg,lr	ep,ta,vg,lr	ep,ta,lr	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta,lr
Minnesota	ti,fi,ep,ta,lr	ep,ta	fi,ep,ta	ep,ta	fi,ep,ta	ep,ta	ep,ta	ep,ta	ep,ta
Mississippi	ep,vg	ep,vg	ep,vg	ep,vg	ep,vg	ep,ta	ep,ta,vg	ep,ta,vg	ep,ta,lr
Missouri	ep,ta	ep,ta	ep,ta	ep,ta	ep,ta	ti,ep,ta,vg,lr	ep,ta		ep,ta,vg,lr
Montana	ep,ta,vg,lr	ep,ta	ep,ta,vg,lr	ep,ta,vg	ep,ta,vg	ep,ta	ep,ta	ta	ep,ta,lr
Nebraska	ep,vg,lr	ep				ep,ta			ta,lr
Nevada	ta,lr	ta,lr	ta,lr	ta	ta	ta	ta	ta	
New Hampshire	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta	ep,ta	ep,ta,lr	ep,ta,lr
New Jersey	vg,lr	vg,lr	vg,lr	vg,lr	vg,lr	ep,vg,lr			lr
New Mexico	ep,ta,vg,lr	ta,vg	ta,vg	ta,vg	ta,vg	ta,vg	ta,vg		ta,vg,lr
New York	ta,vg	ta,vg	ta,vg,lr	ta,vg	ta,vg	ti,ta,lr	lr	ta,vg	lr
North Carolina	fi,ep,ta,vg	ep,ta,vg	fi,ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta		ep,ta	ep,ta,vg
North Dakota	lr	lr		ta		ta	ta	ta	ta
Ohio	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg		ep,ta,lr
Oklahoma	ep,ta,vg	vg	ep,ta,vg	ta	ta	ep,ta	ta	ta	ta,lr
Oregon	ep,lr	ep,lr	ep,lr	ep,lr	ep,lr	lr	ep		lr
Pennsylvania	vg,lr	ta	lr	fi,ep,ta,vg,lr	ep,ta,lr	ep,ta	ep,ta,vg	ep,ta	ta,lr
Rhode Island	ta	ta	ta,lr	ta	ta	ta	ta	ta,vg	ta,lr
South Carolina	ep,ta,vg	ep,ta,vg		vg	vg	ep,ta,vg		vg	ep,ta,vg,lr
South Dakota	vg	vg	vg	vg	vg				lr
Tennessee	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg			ta,vg
Texas	ep,vg	ep,ta,vg	ep,vg	ep		ep			ta
Utah	ta	ta	ta	ta	ta	ta	ta		
Vermont	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg	ep,ta,vg	ep,ta	ep,ta		ep,ta,lr
Virginia	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ta	ep,ta,vg	ep,ta,vg	ep,ta,vg
Washington	ep,ta,lr	ta,lr	ta,vg,lr	ta,vg,lr	ta,lr	lr			ta,lr
West Virginia	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta,vg	ep,ta	ep,ta	ep,ta	ep,ta
Wisconsin	ep,ta,lr	ep,ta	ep,ta	ep,ta	ep,ta	ti,fi,ep,ta,lr	ep,ta,vg	ep,ta,vg	ep,ta,lr
Wyoming	ep	ep	ep	ta	ta	ep,ta	ep,ta	ep,ta	ep,ta,lr

FOREST PRACTICE MATRIX NOTES

Columns list state responses to a survey on policies states use to influence forest practices on private land.

Abbreviations mean the following: ep = educational program; ta = technical assistance; vg = voluntary guidelines; fi = financial incentive; ti = tax incentive; lr = legal regulation.

Column 1 — Policies used by state to limit nonpoint source water pollution from forest practices.

Column 2 — Policies used by state to promote buffer strips along streams and lakes.

Column 3 — Polices used by state to mitigate water quality impacts of forest-road stream crossings.

Column 4 — Policies used by state for influencing forest road designs and construction practices.

Column 5 — Policies used by state for influencing skid trail design and construction practices.

Column 6 — Policies used by state to encourage sound timber harvest practices.

Column 7 — Policies used by state to address the size of clearcuts.

Column 8 — Policies used by state to encourage buffer strips along public roadways.

Column 9 — Policies used by state to address herbicide and pesticide applications on forest land.

Source: Dr. Paul Ellefson and Russell Henly, University of Minnesota, unpublished survey of state forestry programs, 1985.

Fire Management Matrix

	1	2	3	4	5	6	7	8
Alabama	25,726	206,535	11,226	11,181	45		ep	ep,ta,vg
Alaska	66,301	60,347	494	452	42	lr	lr	lr
Arizona	18,328	25,853	329	253	76	ep,ta	ep,ta	ep,ta,lr
Arkansas	19,728	67,078	4,150	4,071	79	ep,ta,lr	ep,lr	ep,ta,lr
California	31,181	86,945	8,062	7,329	733	fi,ep,ta,vg,lr	fi,ep,ta,vg,lr	fi,ep,ta,vg,lr
Colorado	25,958	24,208	1,194	1,121	73	ep,ta,vg	ep,ta,vg	ep,ta
Connecticut	2,390	2,141	905	903	2	ta		ep,ta,lr
Delaware	557	1,454	34	32	2			
Florida	27,102	75,265	5,169	4,364	805	lr	ep,lr	ep,lr
Georgia	27,279	51,974	12,569	12,204	365		ep,ta,vg	ep,ta,lr
Hawaii	3,306	27,544	113	112	1			
Idaho	6,026	4,811	426	294	132	ep,ta,vg,lr	ep,ta,vg,lr	ep,ta,vg,lr
Illinois	8,453	7,198	121	121	0	ta	ta	ta
Indiana	7,328	4,657	307	306	1	ep,ta	ep,ta	ep
Iowa	7,612	4,260	2,556	2,550	6	ta	ta	
Kansas	18,470	38,290	2,844	2,737	107			
Kentucky	16,936	285,036	3,283	3,274	9		ep,lr	
Louisiana	122,855	90,060	7,103	7,083	20			ta,lr
Maine	20,192	3,693	824	756	68	ta,lr	ta	
Maryland	3,552	7,296	857	836	21	ti,fi,ta,lr	ti,fi,ta	ta,lr
Massachusetts	3,581	6,116	4,348	4,342	6	ep,ta,lr	ep,ta	
Michigan	20,600	9,523	846	809	37	ep,ta,lr	ep,ta,vg	ep,ta
Minnesota	22,800	88,144	2,844	2,802	42	ep,ta	ep,ta	ta
Mississippi	19,858	170,281	10,060	10,043	17	ep,ta	ep,ta	ep,ta,vg
Missouri	16,587	29,732	3,348	3,329	19			
Montana	48,633	4,639	547	488	59	ta,lr	lr	ep,ta,vg,lr
Nebraska	49,083	29,850	1,476	1,350	126	ta	ep,ta	ta
Nevada	81,687	17,688	212	130	82	ta,lr		ta,lr
New Hampshire	4,631	159	501	495	6	ep,ta,lr	ep	ep,ta
New Jersey	2,895	2,268	982	977	5	ep,lr	ep	lr
New Mexico	42,500	63,710	624	542	82	ta,lr	ta	ta
New York	16,957	1,072	270	268	2	lr		
North Carolina	19,540	17,814	3,844	3,755	89	ep,ta	ep,ta,vg,lr	ep,ta,vg
North Dakota	31,879	6,919	428	412	16			ta
Ohio	5,823	9,793	1,622	1,620	2	ep,ta,vg	ep,ta,vg,lr	ep,lr
Oklahoma	5,080	33,319	1,786	1,769	17	ta	ta	ta
Oregon	13,099	73,292	1,434	953	481	ta,lr	lr	ta,lr
Pennsylvania	19,541	5,309	1,330	1,325	5	ep,ta		vg
Rhode Island	433	184	116	115	1	ta,vg	ta,vg	vg
South Carolina	12,558	21,190	5,463	5,313	150		ep,ta,vg	ep,ta,vg,lr
South Dakota	20,653	52,277	1,638	1,455	183	vg		vg
Tennessee	12,672	112,459	5,478	5,447	31	ta,vg	fi,ep,ta,lr	ep,ta,lr
Texas	20,659	28,730	2,255	2,242	13			ta,lr
Utah	15,000	28,299	490	315	175	ta	ta	lr
Vermont	4,638	424	199	196	3	ep,ta,lr		
Virginia	18,325	20,393	1,326	1,284	42	ta	ep,ta,lr	ta,vg
Washington	13,177	9,515	1,582	1,409	173			
West Virginia	12,833	429,174	2,273	2,261	12	ta	ta	
Wisconsin	18,898	4,867	2,076	2,003	73	ep,ta,vg,lr	ep,ta,lr	ep,ta,lr
Wyoming	25,540	21,123	816	680	136	ep,ta,lr	ep	

FIRE MANAGEMENT MATRIX NOTES

Fire Statistics, 1987

Column 1 — Acres of rural land under formal protection of state and local fire fighting agencies. (thousands)

Column 2 — Acres of land burned by wildfires in 1987

Column 3 — Total number of wildfires in 1987

Column 4 — Number of person-caused wildfires in 1987

Column 5 — Number of lightning-caused wildfires in 1987

Source: U.S. Dept. of Agriculture, Forest Service, Fire Management and Analysis Unit, February 1989. Data is preliminary and may be subject to adjustment.

Fire Management Policies

Abbreviations mean the following: ep = educational program; ta = technical assistance; vg = voluntary guidelines; fi = financial incentive; ti = tax incentive; lr = legal regulation.

Column 6 — Policies used by state encourage private landowners to remove or treat slash (slash is wood left behind following timber harvests; it is prime fuel for forest fires).

Column 7 — Policies used by state to encourage private landowners to implement general forest fire prevention techniques.

Column 8 — Policies used by state to encourage private landowners to use prescibed burning and smoke-management techniques.

Source: Dr. Paul Ellefson and Russell Henly, University of Minnesota, unpublished survey of state forestry programs, 1985.

Tree Planting Matrix

	1	2	3	4	5	6	7
Alabama	20	480	213,200	183,300	0	76,654	225,197 (52%)
Alaska	321	0	42	0	0	200	0 (0%)
Arizona	0	0	215	0	0	112	*0
Arkansas	30	0	63,952	82,910	0	29,652	76,582 (49%)
California	225	160	7,790	21,400	500	2,622	652 (.4%)
Colorado	35	137	2,231	0	39	1,523	636 (.03%)
Connecticut	141	0	804	0	0	1,023	*0
Delaware	0	0	1,712	0	0	0	116 (26%)
Florida	1,648	0	109,487	157,030	0	66,268	84,388 (91%)
Georgia	343	0	416,800	186,726	0	195,400	470,392 (92%)
Hawaii	705	0	196	0	0	462	0 (0%)
Idaho	864	0	613	6,170	463	641,000	1048 (.1%)
Illinois	0	0	5,105	0	0	3,650	8463 (2%)
Indiana	64	119	2,023	0	2,600	5,556	4677 (2%)
Iowa	0	0	5,510	0	0	3,777	6,923 (.5%)
Kansas	0	225	2,362	0	0	130	2,080 (.09%)
Kentucky	17	0	11,431	1,105	305	9,139	1,802 (.5%)
Louisiana	0	186	26,937	117,943	4,914	44,320	33,445 (43%)
Maine	0	0	1,555	9,850	0	1,421	1690 (6%)
Maryland	145	60	6,591	1,690	0	4,300	844 (12%)
Massachusetts	0	0	0	0	0	0	10 (40%)
Michigan	3,960	15	9,110	2,000	1,000	3,149	6,476 (5%)
Minnesota	12,064	0	17,847	2,626	0	18,100	32,691 (2%)
Mississippi	10,672	9,183	256,374	84,535	1,189	74,337	298,861 (55%)
Missouri	531	234	1,774	127	0	5,799	4,183 (.3%)
Montana	803	0	87	10,193	0	1,332	1,188 (.05%)
Nebraska	0	35	6,570	0	0	0	1,686 (.15%)
Nevada	100	50	175	75	50	175	0 (0%)
New Hampshire	0	0	285	0	0	390	*0
New Jersey	173	0	253	0	0	747	0 (0%)
New Mexico	0	0	268	0	0	15	0 (0%)
New York	0	0	1,877	0	0	5,929	2,130 (5%)
North Carolina	261	677	93,525	53,062	0	51,885	60,226 (58%)
North Dakota	0	7	235	0	0	1,062	747 (.04%)
Ohio	0	0	2,107	0	0	7,243	5,797 (4%)
Oklahoma	0	1,183	5,540	16,630	0	4,069	528 (.05%)
Oregon	6,387	150	14,778	78,238	0	14,600	1,078 (.2%)
Pennsylvania	0	0	1,886	1	0	3,378	1,619 (3%)
Rhode Island	0	0	14	6	0	0	*0
South Carolina	1,026	43	154,705	70,867	2,168	78,788	164,629 (80%)
South Dakota	0	62	4,760	0	0	1,572	795 (.08%)
Tennessee	230	130	13,939	14,156	845	11,038	18,337 (5%)
Texas	21	35	22,426	127,909	0	23,806	10,740 (.3%)
Utah	0	0	0	0	0	0	0 (0%)
Vermont	0	0	491	0	0	500	0 (0%)
Virginia	536	158	61,085	37,434	3,246	75,271	20,661 (42%)
Washington	16,096	0	8,894	105,000	0	12,050	1,010 (.1%)
West Virginia	0	100	1,577	1,158	256	0	21 (4%)
Wisconsin	1,835	0	15,376	0	0	22,446	29,561 (7%)
Wyoming	0	0	23	0	0	0	8 (.003%)

TREE PLANTING
MATRIX NOTES

Column 1— Trees planted on state-owned forest land, during FY 1988 (in acres).

Column 2 —Trees planted on other public, non-federal lands, during FY 1988 (in acres).

Column 3 —Trees planted on private forest land, other than timber and other industry land during FY 1988 (in acres).

Column 4 —Trees planted by timber industry, during FY 1988 (in acres).

Column 5 — Trees planted by other industries, during FY 1988 (in acres).

Column 6 — State nursery production in FY 1988 (in thousands of trees).

Column 7 — Acres of trees planted through the federal Conservation Reserve Program (CRP), and percent of total CRP enrolled acreage planted to trees. *Indicates state has no acres enrolled in the CRP. Figures are cumulative through May 1988.

Source: USDA, Forest Service, Cooperative Forestry Unit, February 1989. Columns 1-6 are based on preliminary data and may be subject to adjustments.

Technical Assistance Matrix

	1	2	3	4
Alabama	14,635	204,000	41,063	0
Alaska	142	142	94	1,000
Arizona	68	4,226	236	1,001
Arkansas	2,407	41,018	1,612	967
California	3,912	8,488	2,752	2
Colorado	1,138	2,650	420	2,836
Connecticut	802	804	92	0
Delaware	958	2,395	50	461
Florida	3,676	106,988	18,265	207
Georgia	18,009	249,421	13,031	1,771
Hawaii	339	312	0	30
Idaho	2,684	628	373	2,240
Illinois	13,988	5,485	3,200	1,568
Indiana	2,655	7,743	9,808	2,125
Iowa	1,295	5,862	1,574	654
Kansas	624	780	893	339
Kentucky	1,277	7,994	1,798	4,901
Louisiana	1,571	29,480	27,843	1,252
Maine	1,574	1,477	4,872	136
Maryland	3,032	6,999	4,338	3,846
Massachusetts	1,382	14,094	3,702	10,628
Michigan	928	3,110	869	3,132
Minnesota	6,332	21,285	3,028	8,875
Mississippi	14,437	238,247	28,246	3,006
Missouri	2,158	2,320	2,827	16,435
Montana	640	142	256	1,919
Nebraska	813	67	25	36
Nevada	17	450	1,995	392
New Hampshire	3,068	540	603	451
New Jersey	1,413	715	457	573
New Mexico	125	50	50	600
New York	3,006	4,547	4,103	11,091
North Carolina	6,695	108,669	4,638	29,181
North Dakota	747	277	4	57
Ohio	3,373	2,107	3,460	4,002
Oklahoma	774	2,480	1,052	594
Oregon	6,138	29,195	22,894	2,605
Pennsylvania	2,605	1,887	1,940	2,456
Rhode Island	268	47	111	57
South Carolina	4,188	155,800	7,862	1,998
South Dakota	340	2,544	312	380
Tennessee	2,530	14,042	97	2,228
Texas	2,127	22,546	413	11,054
Utah	10	0	18	400
Vermont	3,586	491	2,240	3,549
Virginia	8,668	60,619	24,741	55,343
Washington	1,079	8,894	4,943	17,374
West Virginia	3,030	2,263	1,334	0
Wisconsin	9,910	24,330	3,229	20,933
Wyoming	167	5	825	277

TECHNICAL ASSISTANCE MATRIX NOTES

Column 1 — Woodland owners assisted by state forestry program, FY 1988.

Column 2 — Reforestation assistance to private landowners provided by state forestry program, FY 1988 (in acres reforested).

Column 3 — Timber-stand improvement assistance to private landowners provided by state forestry program, FY 1988 (in acres).

Column 4 — Timber-sale assistance to private landowners provided by state forestry program, FY 1988. Measured in volume of timber harvested for sale (in thousand cubic feet).

Source: USDA, Forest Service, Cooperative Forestry Unit, February, 1989. Figures are based on preliminary data and may be subject to adjustments.

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WITH SPECIAL THANKS TO:

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THE STATE OF THE STATES
1989

SOLID WASTE RECYCLING

2

FOCUS PAPER

RENEW AMERICA

Solid Waste Recycling
Focus Paper

By:

Amy Sapowith
Renew America
March 1989

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Introduction

The Solid Waste Recycling Focus Paper is a supplement to the 1989 *State of the States* report. Like the main report, it includes matrices, a map, and a discussion of state recycling and waste reduction activities. The focus paper also contains additional matrices on state market development efforts, recycling collection activities, sources of funding for state recycling programs, and other topics. The focus paper is not intended to be a comprehensive assessment of solid waste recycling and reduction activities in each state, but a compilation of the best information available about key solid waste legislation and programs currently operating in the states.

During the past decade, solid waste management, traditionally a local concern, has become a state as well as a federal responsibility. Driven by the environmental threats and high costs of landfills and incinerators, officials at the state level are initiating comprehensive waste management programs that emphasize recycling and waste reduction. This report reviews state efforts to maximize the recovery and reuse of valuable waste materials from the municipal waste stream and recognizes the opportunity for economic development inherent in a renewed commitment to a recycling ethic. For further information, please see the list of contacts on page 34 of this report.

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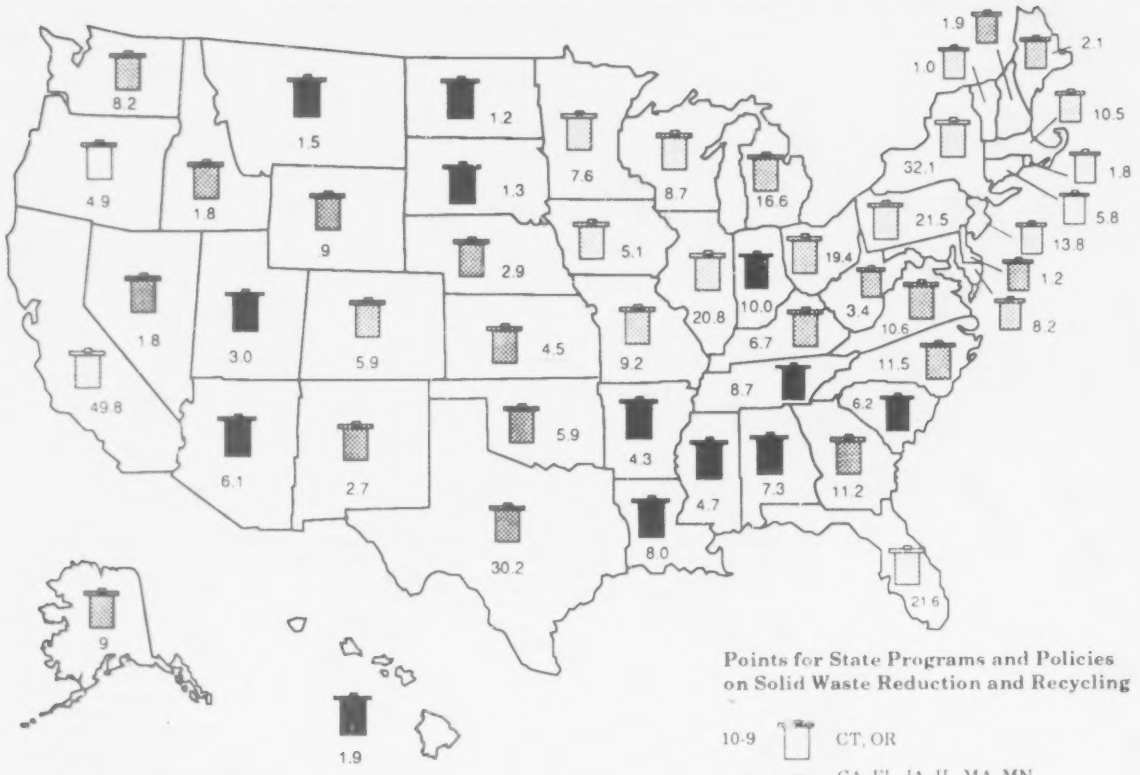
RESIDENTIAL SOLID WASTE



Key to Reading the Map

Example: Oregon - Best Overall

10 Points for Programs and Policies

4.9

4,900 tons of residential solid waste generated daily in 1988 (based on 3.6 lbs/person/day)

Points for State Programs and Policies on Solid Waste Reduction and Recycling

10-9	CT, OR
8-7	CA, FL, IA, IL, MA, MN, NJ, NY, PA, RI, VT, WI
6-5	MD, ME, MI, MO, OH, WA
4-3	AK, CO, DE, GA, ID, KS, KY, NC, NE, NH, NM, NV, OK, TX, VA, WV, WY
2-1	AL, AR, AZ, HI, IN, LA, MS, MT, ND, SC, SD, TN, UT

Source: Renew America, 1989

FOREWORD

From the grassroots of America, a national materials policy is emerging. Sobered by the realization that pollution has become a planetary phenomenon and that we are the world's biggest polluters, Americans are designing a responsible materials policy from the ground up.

The first step occurred in the 1970's, when we changed the rules governing our resource use. For the first time we began to factor the true costs of pollution into the prices we pay for our goods and services. We imposed increasingly stringent purity standards for water and air. We demanded an end to open dumping of garbage.

In short, we raised the cost of wastefulness. The cost of garbage disposal, for example, increased more in the last decade than the price of oil did in the 1970's. This dramatic price change, in turn, spurred a fever of entrepreneurial activity. Before 1980, 99 percent of all communities didn't even know how much garbage they generated, let alone its composition. Today we can not only identify, but can potentially re-use, up to 80 percent of that waste stream.

Hemmed in by closing landfills and attracted by the high price of energy in the early 1980s, local, state, and federal officials sought to replace dumps with incinerators. Citizen organizations rose in protest. Destroying materials via combustion is as bad as destroying them in dumps. By recovering used products, we save the enormous resources expended, and pollution created, to extract and convert virgin materials into finished products. Recycling a ton of garbage can save as much as three tons of virgin materials. Materials recovery, not materials destruction, should be our objective.

By the mid 1980s the citizens' message was getting through. In 1987, more incinerators were cancelled nationwide than were permitted. Long an afterthought of garbage policy, materials recovery was about to become its cornerstone. Government agencies that in 1983 had predicted a maximum 10 percent recycling rate were, by 1985, conceding that 50 percent recycling was feasible. In 1989 even that goal seems conservative.

Materials recovery is the first step, but only the first step, toward a materials-responsible economy. As my colleague David Morris points out in *The New City States*, "San Francisco disposes of as much aluminum each year as is extracted from a medium-sized bauxite mine, as much copper as a small-sized copper mine, and as much paper as is made from a good-sized timber stand." We will soon treat our cities as mines. But after mining our urban ore we still have a choice. We can, like developing nations, export our "raw" materials and buy them back as finished products. Even now we do this with a significant portion of our scrap paper and scrap steel. Or we can process them into finished products within our regional economies. Doing this will not only strengthen these economies, it will profoundly change the industrial base of our nation.

In the following pages, Renew America presents us with a snapshot, a report in progress, of this emerging materials policy. The report reflects the creative juices of fifty states, 3000 counties, and countless communities that are grappling with the darker side of the consumer economy. These pages tell the story of a revolution in process, of a hitherto profligate nation coming to maturity and accepting responsibility for its own wastes. And in so doing, recharting its economic and industrial future.

- *Neil Seldman*
President
Institute for Local Self-Reliance
Washington, D.C.

Solid Waste Recyling

Rockford, Illinois residents can win more than $1,000 just for taking out the trash. In one of the country's most innovative programs for voluntary recycling, Rockford's "trash lottery" rewards randomly selected households for separating the recyclable materials from their garbage, and pays them from the city's savings in landfill costs. In King County, Washington strong support for recycling brought a postponement of plans to incinerate waste. County officials along Puget Sound are targeting 65 percent of the waste stream for recycling by the year 2000. And in New Jersey, where the landfill problem long ago reached crisis proportions, the state has required each county to recycle 25 percent of its waste within two years.[1]

Currently, municipal solid waste landfills make up as much as 21 percent of the sites on the National Priorities List for the federal Superfund program directed at cleaning up the nation's worst hazardous waste sites. As environmental pollution from landfilling and incineration of trash becomes more apparent and disposal costs soar, policy makers across the country are turning to what could become very far-reaching programs for waste reduction and recycling.

The U.S. currently produces more than 11 billion tons of nonhazardous solid waste each year. This includes industrial nonhazardous waste, oil, natural gas and mining wastes, and commercial and residential trash—also known as municipal solid waste. Industry generates the greatest portion of the waste stream—an estimated 7.6 billion tons. The industrial waste stream, which is disposed mainly on-site, has received little public scrutiny or regulation.[2]

By comparison, municipal solid waste amounts to 160 million tons per year, and has been the principal focus of recent state and local policy-making. Since 1960 the tonnage of commercial and residential waste has increased 80 percent. The federal Environmental Protection Agency (EPA) expects it to increase another 20 percent by the year 2000, rapidly outstripping the growth in population.[3]

The growing mountains of trash also threaten to overwhelm the present waste disposal infrastructure of landfills and incinerators, which was rated a "C-" in a report issued by the National Council on Public Works Improvement.[4] Landfill space, in particular, is rapidly becoming a scarce and expensive commodity. EPA expects nearly three-fourths of all municipal solid waste landfills to close within 15 years. Forty-five percent of these landfills, principally in the more densely populated northeastern states, are expected to close within five years. Meanwhile, the average tipping fee that waste haulers pay to unload at landfill sites doubled from $10.80 per ton in 1982 to $20.36 per ton in 1987. In the Northeast, average tipping fees in 1987 were $39.23 per ton.

Currently, ten percent of municipal waste is incinerated, ten percent is recycled, and 80 percent is landfilled.[5] Against a backdrop of decreasing disposal capacity, soaring costs, and strong citizen opposition to new landfills and incinerators, the stage is set for a fundamental rethinking of the nation's waste management policies.

The Limited Federal Role

Prior to 1920, 70 percent of American cities maintained source-separated recycling programs. During World War II, the federal government also rallied communities and industries to recycle and reuse up to 25 percent of the waste stream. But following the war, commitment to recycling dropped off.[6] Finally, in the mid-1960s and early 1970s widespread pollution and litter brought a resurgence of interest in recycling and waste reduction.

In 1965 Congress passed the Solid Waste Disposal Act, which supported alternatives to unregulated dumping and incineration. In 1970 the Solid Waste Disposal Act was amended by the Resource Recovery Act which directed EPA to review the potential for waste reduction and emerging waste reduction programs across the country. In 1976 the Resource Conservation and

Recovery Act (RCRA) encouraged states to develop state solid waste management plans that would give priority to management approaches that conserved material and energy resources. RCRA established minimum siting and operating standards for solid waste disposal facilities and provided states with technical and financial assistance. RCRA also established a Resource Conservation Committee to study the impact of federal policies on individual and industrial resource conservation practices.

The growing support for national legislation for recycling and waste reduction was sidetracked by the energy crisis which spawned an interest in incinerating waste for energy, and by the emergence of toxic waste dumps as a new national crisis. By 1981, EPA's solid waste grant program to states was eliminated by budget cuts. Since that time, state and municipal solid waste managers have received little, if any, federal assistance. Only 18 states have current solid waste management plans or comprehensive regulations in place. Eleven additional states devised plans as directed by RCRA but have not updated them. Nine states are revising or developing current plans.

Limited landfill space and the high visibility of medical waste washing up on beaches, along with growing concern over toxic compounds from incineration plants, have once again turned public attention to solid waste management. The states as well as the federal government are assuming broader responsibilities.

Waste Reduction: The First Essential Step

Recycling and waste reduction have been recognized by many local and state officials as the core of integrated waste management. The first essential step is reduction of the volume of waste through new packaging laws and process modifications. The second step is recycling, composting, and reuse of waste material. The least preferable options, to be pursued only after waste reduction and recycling have been fully implemented, are incineration to reduce volume and extract energy, and finally landfill disposal.

Some analysts claim that the municipal solid waste stream can be reduced by 20 percent by combining packaging design and process modifications that favor reusable and durable containers, and by generally advocating reduced consumption.[7] "Waste reduction" means eliminating waste at its source and packaging is one of the first targets. One-third of the waste stream is comprised of packaging and containers. Paper and paperboard are the principal packaging materials, followed by glass and plastics. Plastics are rapidly replacing glass, however. The plastics industry estimates that the use of plastics, principally for packaging, will increase 36 percent by the year 2000. A recent study conducted for the EPA concludes that approximately 5.6 million tons of plastic packaging were discarded in 1986.[8]

Increased plastics consumption is cause for concern due to the environmental threats posed by the production and disposal of plastics, including five of the six ranked by EPA as generating the most hazardous waste. Such chemicals may later enter the environment as toxic air emissions, hazardous waste, and toxic effluent. In particular, the incineration of plastic resins has been linked to the production of heavy metals and dioxin, a known carcinogen.[9]

Packaging Restrictions

Waste reduction activity in the states is currently focusing on reducing or banning certain types of packaging materials, and requiring plastics used for containers to be biodegradable or photodegradable. Packaging and container legislation accounted for an estimated 300 bills introduced in more than 35 state legislatures in 1988. Seventy-three of these bills pertained to plastic packaging specifically, and 133 related to plastics in some other way. Twenty-two bills proposed a tax on disposable containers.[10]

Sixteen states passed legislation that bans the use of non-biodegradable six-pack plastic beverage rings.[11] Similar legislation is pending in twenty-two states. Little is known, however, about the degradation process and the environmental effects of the chemicals and other plastic ingredients that are the by-products of degradation.

Recent solid waste legislation in Florida will impose a one-cent advance-disposal fee on every container sold at retail that isn't recycled at a 50 percent rate statewide beginning October 1, 1992. The law also bans the sale of beverage containers with detachable

SOLID WASTE RECYCLING
MAIN MATRIX

	1	2	3	4	5	6	7	8	9	10	11	12	13
Alabama	122	5 - 10	96/2/2	NC*				O				1/1	T
Alaska	179	>10	90/<1/10		P,Y				Y			2/0	F
Arizona	96	>10	99/1/0	NC								0/0	
Arkansas	84	>10	94/1/5	NC		T						2/0	T
California	400	>10	88/11/1	Y	B,P,Y*	T/F	Y	O	Y	Y		2/1	T
Colorado	122	5 - 10	>90/unk/<1			T/F		T				0/0	T
Connecticut	91	<5	95/2/4	Y	M,B,P,C,Y	T/F	Y	O T	Y	Y	Y	4/1	T/F
Delaware	3	>10	50/7/43		B,P	F*	Y					1/0	F*
Florida	126	5 - 10	65/10/25	Y	M,B,P,C,Y	T/F	Y	O T I	Y	Y		8/6	T/F
Georgia	198	>10	94/1/5	NC		T/F	Y	O				1/0	T
Hawaii	19	5 - 10	84/3/13			F		O	Y			1/0	F
Idaho	95	>10	96/<1/<2	NC		T	Y	I		Y		1/0	T
Illinois	168	5 - 10	95/2/3	R	P,C,Y*	T/F	Y	I	Y	Y		1/0	T
Indiana	96	5 - 10	94/5/1	NC*		F*		I				1/1	T/F*
Iowa	83	>10	95/3/2	R	B,P,Y*	T/F	Y	O I	Y		Y	0/0	T/F
Kansas	124	>10	99/1/0	NC*		T		O	Y			0/0*	
Kentucky	107	<5	unk/unk/0	*		F*	Y			Y		0/0	F*
Louisiana	93	>10	90/1/9	*			Y					0/0	
Maine	294	5 - 10	85/5/10	*	B,P	T/F	Y	O			Y	2/0	T/F
Maryland	42	5 - 10	88/8/4	*	M,Y	T/F		O I				2/0	T/F
Massachusetts	203	<5	78/5/17	Y	B,P,Y	T/F	Y	O	Y	Y	Y	5/1	F
Michigan	58	5 - 10	85/7/8	Y	B,P	T/F	Y	O I	Y	Y		1/2	T/F
Minnesota	105	5 - 10	92/4/4	Y	P,C,Y	T/F	Y	O T I	Y	Y	Y	6/3	T/F
Mississippi	108	>10	unk									1/0	T
Missouri	106	5 - 10	unk	R	Y	F	Y	I	Y	Y		1/1	T/F
Montana	129	5 - 10	99/<1/<1			T				Y		1/0	T
Nebraska	42	<10	97/3/0	NC*		T/F				Y		0/0	T
Nevada	107	<10	100/0/0	NC		F	Y	O				0/0	
New Hampshire	70	5 - 10	74/5/12	NC	Y	F			Y	Y	Y	3/0	F
New Jersey	73	<5	89/10/<1	Y	M,P,Y	T/F	Y	O		Y	Y	2/6	F
New Mexico	213	>10	97/3/0	Y		T						0/0	
New York	304	5 - 10	83/1/16	Y	M,B,P,Y*	T/F	Y	O I	Y	Y	Y	9/8	T/F
North Carolina	124	>10	98/<1/1	NC		T/F		I		Y		1/1	T/F*
North Dakota	100	>10	unk			T						0/0	T
Ohio	149	<5	85/2/13	*	Y	T/F	Y	O I		Y		1/0	
Oklahoma	123	5 - 10	unk	NC	Y*	T						2/0	
Oregon	127	>10	75/20/5	NC	M,B,P,C*,Y	T/F*	Y	O T		Y		1/0	T
Pennsylvania	135	<5	95/1/4	R	M,P,C,Y	T/F	Y	O T I	Y	Y	Y	2/5	T/F
Rhode Island	11	5 - 10	98/3/0	Y	M,P,Y	T/F	Y	O I	Y	Y	Y	0/2	T/F
South Carolina	80	>10	99/unk/1									1/1	T
South Dakota	55	>10	100/0/0	NC		T						0/0	T
Tennessee	120	>10	unk	NC		T/F*						4/0	T/F*
Texas	926	>10	90/6/2		Y*	T		I		Y		3/0	T
Utah	112	>10	unk			T						1/0	T
Vermont	69	5 - 10	82/12/6	Y	B,P,Y	T/F	Y	I	Y		Y	0/0	F
Virginia	147	<5	95/1/4	Y		T/F	Y	O				6/1	T/F
Washington	118	>10	90/5-10/1	Y	M,Y	T/F	Y	O T			Y	1/1	F
West Virginia	141	<5	>99/<1/<1			F	Y					0/0	F*
Wisconsin	933	>10	23*/74*/3*	Y	M,P,C,Y	T/F	Y	O T I	Y	Y		1/0	T/F
Wyoming	78	>10	97/3/0			T/F		O				0/0	T

rings; requires, as of January 1, 1990, that all plastic carry-out bags degrade within four months; bans polystyrene foam or plastic-coated paper used in connection with food; and, as of October 1990, bans containers made with fully halogenated chlorofluorocarbons (CFCs), which contribute to the depletion of the ozone layer. Maine and Massachusetts have also passed restrictions on containers made with CFCs.[12]

At least eight states have established source reduction or packaging task forces. Rhode Island requires any business with more than 100 employees to file a waste audit. Other states are pursuing waste reduction education programs and are providing waste reduction grants.

At the federal level, legislation has been proposed that would require the Department of Commerce and the EPA to issue regulations on many consumer products and packaging to require certain products to be either recyclable or degradable. EPA's Municipal Solid Waste Task Force is calling on manufacturing and design industries to take a leadership role in designing packaging and containers.

State and Local Recycling Programs

While the U.S. as a whole recycles only 10 percent of the 160-million-ton annual municipal solid waste stream, some analysts argue that rates of 70-80 percent can be achieved.[13] Individuals, commercial businesses, and industry all produce "wastes" that are recyclable or reusable. Materials as diverse as aluminum, paper, glass, plastics, yard waste, and rubber are ripe for recycling. These materials can be separated from the waste stream and reprocessed into useful raw materials for products. The U.S. currently recycles 50 percent of its aluminum, 23 percent of its paper, and 1-2 percent of its plastics.

One obstacle to plastics recycling has been the number of containers made of mixed plastics. More than forty-six types of plastic resins are in common use, but only containers made of single resin plastics are readily recyclable. Increasingly, states are requiring the labeling of plastic containers to indicate resin type, recyclability, or degradability.

A second obstacle to plastics recycling is inadequate collection systems. Plastics must be collected, segregated by types, and densified to reduce shipment costs. There is also some concern that an increased reliance on degradable plastics will work at cross-purposes with plastics recycling.

Much of the municipal waste stream can be composted — the process of aerobic, biological decomposition of organic

MATRIX KEY

1. Number of Operating Municipal Solid Waste Landfills.

2. Years of Remaining Municipal Landfill Capacity (Estimated statewide average).

3. Percentage of Municipal Solid Waste Currently Landfilled/ Recycled/Incinerated:
unk = unknown; *= includes agricultural, sewage sludge and other waste streams in calculations.

4. State Solid Waste Management Plans: Y = State has current management plan; NC = State plan is not current; R= No formal plan but regulations that act as a plan; *= draft plan underway.

5. Legislation: M = mandatory recycling; B = beverage container deposit or recycling legislation; P = packaging restrictions (nondegradable plastic bans, product labeling requirements); C= landfill bans or recycling requirements for leaves and/or yard waste (C*=Portland metro area only); Y= procurement legislation for recyclables (Y*= targets paper products only).

6. Recycling: T = technical assistance; F = financial assistance; F *= tax credit only.

7. Public Education and Promotion of Recycling: Y=state program.

8. Used Oil, Scrap Tires and Industrial Waste: O = encourages used oil recycling; T= encourages scrap tire recycling; I= promotes recycling and reduction of industrial nonhazardous waste.

9. Household Hazardous Waste Collection; Y= has provided state funding.

10. Market Development Assistance Programs: Y= yes.

11. Have Source Reduction or Packaging Task Forces:
(includes states participating in the Coalition of Northeastern Governors, CONEG).

12. Number of Municipal Solid Waste Mass Burn Incinerators Operating or in Startup/ Number Under Construction, Permitting, or Financing.

13. Incineration: T = Technical Assistance for incineration; F = financial incentives for incineration;
F * = tax credit only.

For sources, see page 11.

waste. Approximately 70 percent of discarded municipal solid waste is compostable: 18 percent yard waste, 9 percent food waste, 4 percent wood, and 36 percent paper and paperboard.[14]

The average cost of composting ranges from $35 per ton to $ 50 per ton. This cost can be reduced if composting is combined with source separation or curbside programs that remove glass and metal that are recyclable but not compostable. Composting leaf and yard waste produces a marketable product for landscaping and nurseries, parks and recreation departments, horticulture, land reclamation, public works projects, and agriculture. Moreover, composting processes have minimal environmental impact and can be expanded to include sludge and septage.

A few municipalities have moved forward quickly on the recycling front. On opposite coasts, Woodbury, New Jersey and Davis, California currently recycle more than 30 percent of their waste tonnage, while many other cities have reached a 20 percent recycling mark.

Although ten states have enacted mandatory recycling legislation, only eight are implementing or developing comprehensive recycling programs: Connecticut, Florida, Maryland, New Jersey, New York, Oregon, Pennsylvania, and Rhode Island.

New Jersey's Mandatory Source Separation and Recycling Act of 1987 requires each county to achieve at least 25 percent recycling within two years. Each county must hire a district recycling coordinator and target yard waste such as leaves, as well as at least three other materials to be source separated. Counties must also determine the methods of collection, marketing, and sale of recyclables once collected. Municipalities are responsible for passing the mandatory ordinances that will require citizens to participate. The program is funded by a surcharge on waste disposal at landfills or incinerators, plus an $8 million dollar appropriation in 1987. The majority of the funds are given out directly to municipalities in the form of tonnage grants where the size of the grant is linked to the number of tons recycled by each city. The law is enforced with penalties ranging from fines to refusal to pick up an individual violator's trash.

Among policy makers there is significant debate whether recycling should be mandatory or voluntary. Mandating source-separation by household or generator has been shown to be the more effective action, with program participation ranging up to 90 percent. Even in well-run voluntary programs, 50 percent participation is unusual. According to state recycling officials, public education and promotion are key factors in determining participation rates. In addition to education, a major issue for individuals is convenience. According to public opinion polls conducted between 1972 and 1987, greater than 90 percent of those surveyed favor recycling if it is made convenient.[15] Curbside collection is the preferred method for convenience, and there is evidence that participation is higher when recyclables are picked up the same day as regular

Did You Know ?

- Every Sunday, more than 500,000 trees are used to produce the 88 percent of U.S. newspapers that are never recycled;
- American consumers and industry throw away enough aluminum to rebuild our entire commercial airfleet every three months;
- We throw away enough office and writing paper annually to build a wall twelve feet high stretching from Los Angeles to New York City;
- We throw away enough iron and steel to continuously supply all the nation's automakers;
- We throw away 18 billion dirty plastic disposable diapers a year. A disposable plastic diaper can take 500 years to decompose in a landfill. A cotton, reusable diaper can disintegrate in one to six months.

Sources: Environmental Defense Fund, New York, 1988; Massachusetts Department of Environmental Quality Engineering, Division of Solid Waste Management, Boston, MA, June 1988.

garbage collection, and when residents are provided with special containers in which to separate and store recyclables.

State financial assistance to municipalities, non-profit organizations, and recycling industries in the form of grants, loans, and tax incentives is essential for the successful promotion of recycling programs. Twenty-nine states offer some form of financial assistance for recycling.

States fund their recycling assistance programs in a variety of ways. Minnesota funds its programs principally through state appropriations. Illinois instituted a landfill surcharge in 1986 that was expected to yield a $10 million Resource Recovery Fund. The funds, which actually exceeded the expected $10 million, have been placed in escrow while the constitutionality of the surcharge is challenged by waste haulers. Ohio operates a two-tiered corporate franchise tax that taxes "litter stream producers," such as packaging companies. As of 1988, 50 percent of the approximately $10 million annual fund must be directed to recycling activities. At least nine states have used Exxon oil overcharge funds to provide grants to recycling projects.

Developing Markets

Long-term success of recycling relies on the ability to create and sustain a market for materials. States can play a signficant role both as consumers of recycled materials and by providing legislative and economic incentives to spur market creation.

Twenty-two states have passed legislation requiring state agencies to favor recycled materials in their purchasing policies. Six states specify a purchasing preference for recycled paper products only. Maine requires state agencies to report on purchasing activities and Michigan's state legislature passed a joint resolution recommending a purchasing preference for recycled products.

In Massachusetts, a recently-isssued executive order requires state procurement officials to purchase, to the extent practicable, recycled paper and aluminum, recycled or degradable plastics, and soil supplements from composting facilities. State transportation departments are also exploring the use of recovered materials for state paving and construction projects.

Although nearly half the states, as well as the federal government, have passed procurement legislation since the early 1970s, relatively few recycled products have been purchased. The renewed emphasis on recycling and development of new uniform purchasing standards for paper products by government officials may help overcome this sluggishness. Twenty-two states now have one or more market development-assistance programs that should spur further development of the recycled materials industry. Market development assistance programs include tax incentives, financial and technical assistance, actions to stabilize supply and demand of recyclable materials, actions to attract recycling businesses, consumer education, government-supported research and development, and the removal of regulatory barriers.

One innovative effort in support of recycling businesses uses a concept borrowed from energy conservation—shared savings. A city that source separates its paper and avoids a cost of $60 per ton to dump it in a landfill can pay $40 per ton to the recycling business to help support its costs, and still save $20. Chicago, Newark and Grand Rapids have developed such programs.[16]

The environmental benefits, although not quantified in current costs, must ultimately be seen in terms of savings. Substituting recycled paper resources for virgin paper, for example, consumes significantly less energy and results in 74 percent less air pollution and 35 percent less water pollution for the same amount of paper.[17] More support for research and development is needed to expand the variety and quality of recycled products.

Recycling can also be viewed in broader economic terms. Recycling activities can help revitalize depressed local economies, creating 36 jobs for every 10,000 tons of material recycled, versus 6-10 jobs for every 10,000 tons of material landfilled or incinerated.

While the municipal waste stream contains a wealth of raw materials for a budding recycling industry, potentially hazardous substances like cleaning solvents, paint, and mercury, as well as cadmium from batteries and fluorescent lights, often find their way into landfills and incinerators ill-

equipped to properly treat them. Since 1981, only seven states have sponsored household hazardous waste collection programs, which are designed to provide residents with an outlet to properly dispose of common household hazardous products. Eight other states have provided funding for hazardous waste collection programs. Rhode Island charges a five dollar deposit on lead acid batteries to encourage their return and proper disposal.

Unresolved Conflicts

State policy makers are excited by the possibilities. New York has set the highest statewide goal to date, targeting 50 percent of the waste stream for reduction and recycling by 1997. Florida's new solid waste law sets a statewide goal of 30 percent reduction by 1994 with an interim goal of 50 percent container recycling by 1992. A growing number of states are incorporating the concept of a waste management hierarchy based on waste reduction and recycling into their solid waste plans, though no state has yet tied funding of programs to the hierarchy. But in spite of these positive developments, states currently recycle less than five percent of their waste streams.

The haphazard solid waste management that generally occurs in the U.S. is supported by old habits, economic inertia, and an established industrial infrastructure that perceives threats to its investments. The hotly contested ballot issues over deposit legislation—or "bottle bills"—that support recycling through deposits, return, and reuse of bottles and beverage containers have shown the bottling industry adamantly opposed to recycling proposals. Beverage container deposit or recycling laws have been proposed in almost every state, but have been enacted in only 11 states. In 1987 the bottling industry spent $2.3 million in a campaign to convince Washington, D.C. voters to defeat a proposed bottle-deposit law.[18]

An intense conflict has likewise emerged over the use of waste-incineration plants. A number of states are promoting incineration as their primary waste management process, regarding waste reduction and recycling as only marginal programs. The competition between recycling and incineration is very specific—the elements with the best heat value for waste-to-energy plants are paper or organic materials that could be recycled. There is also competition for scarce state funding. Thirty-five states currently have at least one municipal solid waste incinerator in operation and 26 states provide tax credits, zero- or low-interest loans, or other types of financing assistance for incineration facilities. This funding is far greater than that committed to waste reduction or recycling.

The problems of solid waste management will continue to mount as the waste stream expands. Without successful waste reduction and recycling programs local governments face the prospect of escalating disposal costs, growing shortages of disposal capacity, endless conflicts over siting of landfills and incinerators, and high cleanup costs of environmental contamination. Management of the waste stream has grown from a local issue to a regional, statewide, and even interstate problem. To successfully manage our waste stream, the federal government and the states must make a long-term commitment to reduce the growing volume of waste and make recycling succeed.

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14. Franklin Associates, Ltd, *Characterization of Municipal Solid Waste in the United States, 1960 to 2000* (Update 1988), March 30, 1988.

15. Institute for Local Self-Reliance, *Recycling Goals and Strategies*, 1988.

16. Institute for Local Self-Reliance, staff interview, January 1989.

17. Environmental Defense Fund, *Coming Full Circle*, New York, 1988, p. 11.

18. Environmental Action, staff interview, Washington, DC, 1988.

Ranking Notes

States have been ranked on the strength of environmental programs and policies on a scale of one to ten. The total rank is the compilation of points for the five topics examined (potential total of 50 points). The rankings are not meant to judge particular environmental conditions in each state, but consider environmental problems as a measure of need for program strength. Key factors weighed against this need are: legislative authority for programs, scope of established programs, extent of funding, monitoring, enforcement, and indications of progress. Although programs mandated by state legislatures, rather than innovative projects, are given greater weight, attention is given to assure that states have not simply "papered-over" a problem with new legislation.

The evaluation is both comparative and subjective and is not intended to represent an absolute scale in which the top state is doing everything possible to protect the environment on a given topic. For some topics, such as solid waste recycling, recent progress is very limited despite a few bright spots. And the overall comparison must also be taken within the general stall in momentum for environmental protection.

The rankings are based on research material and data drawn from a variety of sources: individual telephone and mail surveys of the states; information filed by the states with federal agencies; studies and surveys conducted by academic institutions, private contractors, and national environmental organizations; and information from peer reviewers.

In each case, we have used what we believe to be the best data available and noted the sources in the Matrix Notes. There are still shortcomings, however. Some of the data have a generic quality because of the need to use data in which the same criteria has been applied to all states. At times the most recent data of this type are two or three years old. Another problem is that state-supplied information can have varying levels of accuracy. Where a state is obviously out of line, we have contacted state officials to verify or correct information. A more difficult problem is reluctance of government officials to supply data on enforcement, monitoring, or budgets—which leaves us with record of a program in place, but no measure of its scope or effectiveness. A final shortcoming is the absence of adequate data for all of the states on a given subtopic.

The key indicators used in the ranking are contained in the matrix pages, and in some cases sub-matrices that will be published in a more detailed Focus Paper on each topic. Readers interested in more extensive information on a particular topic, or a state ranking on that topic, should request the appropriate Focus Paper (see back page for ordering information).

Solid Waste Recycling

State program rankings emphasized those components identified as contributing to successful recycling efforts around the country: mandatory recycling legislation, financial assistance, and market development efforts. Where it was determined that state mandatory recycling laws have not led to active statewide recycling programs, the legislation was not considered in the ranking. States received more points for having a current solid waste management plan or comprehensive solid waste regulations than for having a draft plan underway. No credit was given for solid waste plans that are not current. Landfill bans or recycling requirements for yard or leaf waste, beverage container legislation, packaging restrictions, and government procurement legislation to stimulate the demand for secondary materials were credited. Procurement legislation that targets paper products only was given less weight than multi-material procurement laws. Whether a state provides technical assistance or public education, or has established a source reduction or packaging task force was also considered in the ranking. States were recognized for encouraging the recycling/collection of used oil, tires, industrial nonhazardous, or household hazardous waste. States that are not fully implementing mandatory used oil recycling legislation were given credit equal to states with voluntary efforts. Finally, state recycling programs were viewed within the broader context of a waste management strategy that sees incineration and landfilling as last resorts. States that have devoted substantial resources to incineration were weighed negatively. States with advanced recycling programs in the absence of a landfill crisis, as indicated by the remaining landfill capacity, were weighed positively.

Solid Waste Recycling Snapshot

Recycling and waste reduction are the centerpiece of new integrated waste management. Development of programs is at an early stage and policies in the states reflect many variations and levels of commitment. There are three key areas of concern: how comprehensive the laws are concerning the diversity of materials; whether programs are voluntary or mandatory; and whether incentives for incineration facilities are undermining recycling efforts.

In addition to Oregon, seven states are implementing comprehensive recycling programs: Connecticut, Florida, Maryland, New Jersey, New York, Pennsylvania, and Rhode Island. All but Oregon strongly support incineration which competes with recycling for limited state funding and for materials in the waste stream.

Oregon is widely recognized for its leadership in recycling. Oregon's Opportunity to Recycle Act requires communities to provide drop-off centers or curbside programs, though it does not require individuals to recycle. The state focuses on market development and encourages recycling and procurement of recycled products through its comprehensive tax credit policies. The state gave a tax credit to the one operating incinerator in Marion County, but since 1987 has declared waste-to-energy facilities ineligible for state tax credits.

Currently:

- 24 states have initiated used oil recycling programs, though few states are fully implementing them;
- only eight states have initiated efforts to recycle scrap tires;
- 18 states have or participate in an industrial nonhazardous waste exchange or other program targeted at recycling industrial solid waste;
- seven states promote composting by banning landfill disposal or requiring the recycling of leaf /yard waste;
- nine states require labeling to indicate recyclability, plastic resin type, or degradability.

The Final Scores

	Percent of Possible Points	*Total Points (out of 50)*	*Rank*	***Solid Waste Points***
California	84	42	1	7
Oregon	78	39	2	10
Minnesota	76	38	3	8
Massachusetts	74	37	4	7
Wisconsin	74	37		8
Iowa	68	34	6	8
New Jersey	68	34		8
Florida	64	32	8	8
Maryland	64	32		6
Connecticut	60	30	10	9
Washington	60	30		5
Maine	58	29	12	5
North Carolina	58	29		3
New York	56	28	14	8
Pennsylvania	56	28		8
Rhode Island	56	28		8
Virginia	56	28		4
Georgia	54	27	18	4
Illinois	54	27		8
Vermont	54	27		7
Michigan	52	26	21	6
Idaho	50	25	22	3
Missouri	50	25		5
Ohio	48	24	24	6
South Carolina	48	24		1
Colorado	44	22	26	3
Delaware	44	22		4
Hawaii	44	22		2
New Hampshire	44	22		4
Texas	42	21	30	3
Arizona	40	20	31	1
Kansas	40	20		3
Nebraska	40	20		4
North Dakota	38	19	34	2
Montana	36	18	35	2
Alaska	34	17	36	3
Oklahoma	34	17		3
Alabama	32	16	38	2
Mississippi	32	16		1
New Mexico	32	16		3
Indiana	30	15	41	2
Kentucky	30	15		3
West Virginia	30	15		3
Wyoming	30	15		4
Nevada	28	14	45	4
Arkansas	26	13	46	2
South Dakota	26	13		2
Utah	24	12	48	2
Tennessee	22	11	49	2
Louisiana	20	10	50	2

Key:

Solid Waste Recycling Points are based on a scale of 1 to 10. The points were derived from the data in the matrices and measure the strength of state programs and policies to protect the environment. See Ranking Notes on page 12 for detailed explanation.

Total Points consist of a maximum score of 50 points. Each of the five topics in the 1989 main report has a maximum value of 10 points. (The five topics are: Forest Management, Drinking Water, Solid Waste Recycling, Food Safety, and Growth and the Environment.) The point values for each topic are added together to give the state's total point score.

Percent of Possible Points indicates each state's total points as a percentage of the total possible points.

Overall Ranking is the ranking of the states based on the total points received for all five topics. In the case of a tie each state is given the same ranking. Example: Both Maine and North Carolina received 29 points and tied for 12th place.

Summary Example: With 25 points, Idaho ranks 22nd in the nation for the strength of state environmental programs examined. For solid waste recycling, Idaho received three points on a 10 point scale. The three points received for solid waste recycling were added to the points received for the remaining four topics to equal the total point score of 25.

* **Oregon** was judged to have the strongest programs and policies for solid waste recycling and received 10 points (see Recycling Snapshot).

STATE PROGRAM FUNDING MATRIX

	1	2	3	4	5	6	7	8
Alabama								
Alaska								
Arizona	X	NA						
Arkansas								
California	X	NA					container tax	NA
Colorado							federal funds	3
Connecticut	X	NA			X	10		
Delaware	X	NA						
Florida							tire/news tax	
Georgia	X	NA						
Hawaii								
Idaho	X	NA						
Illinois	X	NA	X	$.60/cu yd				
Indiana								
Iowa			X	$1.50/ton				
Kansas	X	NA						
Kentucky	X	NA						
Louisiana	X	NA						
Maine	X	NA						
Maryland	X	NA						
Massachusetts					X	NA		
Michigan	X	NA			X	150		
Minnesota	X	NA						
Mississippi								
Missouri								
Montana								
Nebraska							litter tax	.2/yr
Nevada	X	NA					federal funds	
New Hampshire	X	NA						
New Jersey			X	$1.50/ton				
New Mexico	X	NA						
New York	X	26 mill.						
North Carolina	X	NA						
North Dakota	X	NA						
Ohio	X	NA					litter tax	3/yr
Oklahoma	X	NA						
Oregon	X	NA						
Pennsylvania			X	$2.00/ton				
Rhode Island							disposal fee	
South Carolina	X	NA						
South Dakota	X	NA						
Tennessee								
Texas	X	NA						
Utah	X	NA						
Vermont		NA	X	varies				
Virginia	X	NA					litter tax	1.2-1.5/yr
Washington							litter tax	NA
West Virginia							federal funds	NA
Wisconsin	X	NA						
Wyoming	X	NA						

STATE PROGRAM FUNDING MATRIX NOTES

Sources and levels of funding for state recycling programs:*

1. General Revenue

2. 1988 Funding Level (NA = not available)

3. Disposal Tax

4. Disposal Tax Rate (cu yd = cubic yard)

5. Bond Issue

6. 1988 Amount of Bond Issue (in $ millions)

7. Other

8. 1988 Funding Level (in $ millions)
(NA = not available)

*** States with recycling program funding do not necessarily provide financial assistance to recycling projects.**

Source: *Biocycle - Journal of Waste Recycling,* Emmaus, PA, from a forthcoming article by Jim Glenn on the status of solid waste management and recycling, 1989.

RECYCLING AND COMPOSTING PROJECTS MATRIX

	1	2	3	4	5	6	7	8	9	10
Alabama	3	NA	2	1	0	3	3	NA	NA	NA
Alaska	0						0			
Arizona	1	NA	1	0	0	1	0			
Arkansas	2	10,000	2	0	0	2	0			
California	45		45	0	0	45	5	NA	NA	NA
Colorado	2	NA	2	0	0	2	0			
Connecticut	24	NA	18	6	12	12	30+	NA	NA	NA
Delaware	0						1	NA	1	0
Florida	8	NA	7	1	0	8	unk			
Georgia										
Hawaii	0						0			
Idaho	0						1	NA	NA	NA
Illinois	25+	NA	25+		0	25+	6	130-150,000	NA	NA
Indiana	9	NA	9	0	0	9	0			
Iowa	1	15,000	1	0	0	1	1	NA	0	1
Kansas	0						0			
Kentucky	0						0			
Louisiana	3	100,000	3	0	0	3	0			
Maine	2	25,000	2	0	1	1	0			
Maryland	5	NA	5	0	0	5	1	NA	1	NA
Massachusetts	7	NA	4	3	NA	NA	70	NA	NA	NA
Michigan	5+	NA	NA	NA	0	5+	100	NA	NA	NA
Minnesota										
Mississippi	0						0			
Missouri	8	NA	7	1	0	8	10	NA	10	0
Montana	0						0			
Nebraska	2	NA	NA	NA	0	2	2	NA	NA	NA
Nevada	0						0			
New Hampshire	2	30,000	2	0	0	2	0			
New Jersey	439	NA	439	0	439	0	185	NA	NA	NA
New Mexico	0						1	NA	0	1
New York	unk						27	NA	NA	NA
North Carolina	3	15,000	2	1	0	3	1	NA	NA	NA
North Dakota	0						0			
Ohio	13	175,000	11	2	NA	13	3	NA	NA	NA
Oklahoma	1		1			1	0			
Oregon	106	2,600,000	106	0	0	106	6	NA	NA	NA
Pennsylvania	141	1,300,000	75+	NA	55	86	63	NA	NA	NA
Rhode Island	8	300,000	8	0	8	0	5	75,000	5	NA
South Carolina	0						0			
South Dakota	0						0			
Tennessee	2	NA	2	0	0	2	0			
Texas	2	100,000 +	2	0	0	2	2+	NA	NA	NA
Utah	0						1	NA	NA	NA
Vermont	1	10,000 +	1	0	0	1	2	NA	NA	NA
Virginia	4	NA	3	1	1	3	1	NA	NA	NA
Washington	4	500,000	4	0	0	4	4	NA	1	3
West Virginia	2	NA	2	0	0	2	1	NA	NA	NA
Wisconsin	50+	NA	37	13+	7	43	40	NA	NA	NA
Wyoming		0					0			

RECYCLING AND COMPOSTING PROJECTS MATRIX NOTES

1. Number of Curbside Recycling Programs in the State

2. Curbside Population Served

3. Number of Multi-material Collection Programs

4. Number of Single-item Collection Programs

5. Number of Mandatory Recycling Programs

6, Number of Voluntary Recycling Programs

7. Number of Yard Waste Composting Projects

8. Yard Waste Population Served

9. Yard Waste Composting Projects — Leaves Only

10. Yard Waste Composting Projects — Leaves and Grass

unk=data unknown
NA=data unavailable at this time

Source: *Biocycle - Journal of Waste Recycling,* Emmaus, PA, from a forthcoming article by Jim Glenn on the status of solid waste management and recycling, 1989.

OWNERSHIP AND OPERATION MATRIX

	1	2	3	4	5	6	7	8	9	10	11	12
Alabama	90	85	10	15	0	0	100	100	100	100	0	0
Alaska					0		100		0	0	0	0
Arizona	82	75	18	25	0	0	100	100	0	0	0	0
Arkansas							100(1)	100(1)	100	50	0	50
California	65	65	35	35	25(3)	25(3)	75(3)	75(3)	66	66	34	34
Colorado	95	85	5	15	0	0	100	100	0	0	0	0
Connecticut	75	75	25	25	90	90	10	10	100	100	0	0
Delaware	100	0	0	100					60	0	40	100
Florida	85	80	15	20	UNK	UNK	UNK	UNK	100	0	17	83
Georgia	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hawaii	75	75	25	25	0	0	100	100	100(2)	0	0	100(2)
Idaho	80(3)	85(3)	20(3)	15(3)	0	0	100	100	100	100	0	0
Illinois	38		62						100	100	0	0
Indiana	27	13	73	87	0	0	100	100	100	100	0	0
Iowa	60	40	40	60	0		100		100		0	
Kansas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kentucky	44	46	56	54	0	0	100	100	100	100	0	0
Louisiana	25	15	75	85	0	0	100	100				
Maine	95	90	5	10(4)	100	100	0	0	100	50	0	50
Maryland	80	60	20	40	5	10	95	90	10	10	90	90
Massachusetts	89	89	11	11	100	100	0	0	0	0	100	100
Michigan	28		72		0		100					
Minnesota	70	60	30	40	90	80	10	20	60	50	40	50
Mississippi	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Missouri	50	50	50	50					0	0	100	100
Montana	90	60	10	40					100	100	0	0
Nebraska	80	80	20	20	0	0	100	100	0	0	0	0
Nevada	99	80	1	20	0	0	0	0	0	0	0	0
New Hampshire	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
New Jersey	80	80	20	20	80	80	20	20	67	67	33	33
New Mexico	99	89	1	11								
New York	89	90	11	10	40	40	60	60	72	72	28	28
North Carolina												
North Dakota		67		33								
Ohio	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oklahoma	40	40	60	60	1	1	99	99	33	0	66	100
Oregon	44	40	56	60					0	0	100	100
Pennsylvania	50	50	50	50	50	50	50	50	100	100	0	0
Rhode Island	100	87	0	13	85	85	15	15	100(5)	0	0	100(5)
South Carolina	52	51	48	49					0	0	100	100
South Dakota	75	65	25	35								
Tennessee	59	59	41	41					50	25	50	75
Texas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Utah												
Vermont	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia	60	55	40	45	0	0	100	100	100	100	0	0
Washington	80	70	20	30	5	5	95	95	80	25	20	75
West Virginia	65	55	35	45	<10	<10	>90	>90				
Wisconsin	88	87	12	13	50	50	50	50	25	25	75	75
Wyoming	99	99	1	1	1	1	99	99	0	0	0	0

OWNERSHIP AND OPERATION MATRIX NOTES

Ownership and Operation of Solid Waste Management Facilities:

Column 1: Percent of Landfills Publicly Owned

Column 2: Percent of Landfills Publicly Operated

Column 3: Percent of Landfills Privately Owned

Column 4: Percent of Landfills Privately Operated

Column 5: Percent of Recycling Facilities Publicly Owned

Column 6: Percent of Recycling Facilities Publicly Operated

Column 7: Percent of Recycling Facilities Privately Owned

Column 8: Percent of Recycling Facilities Privately Operated

Column 9: Percent of Resource Recovery Facilities Publicly Owned

Column 10: Percent of Resource Recovery Facilities Publicly Operated

Column 11: Percent of Resource Recovery Facilities Privately Owned

Column 12: Percent of Resource Recovery Facilities Privately Operated

(1)= Aluminum cans only
(2)= Not yet permitted
(3)= Estimate
(4)= These facilities handle 30% of the waste, however
(5)= Future requirement by statute
NA=data not available
UNK= unknown

Source: Brown, Steven R. (Center for the Environment and Natural Resources), Shelley Dresser-Gagnon (Eastern Regional Conference), and Deborah Gona (Office of Information Services of the Council of State Governments) in cooperation with New York State Legislative Commission on Solid Waste Management Staff, "Solid Waste Programs in the States," *Journal of Resource Management and Technology*, Vol. 15, No. 3, Sept. 1987, pp. 132-144.

WASTE MANAGEMENT REPSONSIBILITY MATRIX

	1	2	3
Alabama	Y		
Alaska	Y		
Arizona	Y (1)	Y (1)	Y (1)
Arkansas		Y	Y
California	Y		
Colorado	Y		
Connecticut			Y
Delaware	Y		
Florida	Y		
Georgia			
Hawaii	Y		
Idaho	Y (2)	Y (2)	
Illinois	Y		
Indiana	Y		
Iowa	Y		
Kansas			
Kentucky		Y	
Louisiana	Y		
Maine	Y		Y
Maryland	Y		
Massachusetts	Y (3)		Y (3)
Michigan	Y	Y	
Minnesota	Y (4)	Y (4)	
Mississippi	Y		
Missouri		Y	Y
Montana	Y		
Nebraska	Y		
Nevada	Y		
New Hampshire			
New Jersey		Y	
New Mexico	Y		
New York			Y
North Carolina		Y (5)	Y (5)
North Dakota	Y		
Ohio			
Oklahoma	Y		
Oregon	Y		
Pennsylvania	Y		
Rhode Island	Y		
South Carolina	Y (4)	Y (4)	
South Dakota	Y		
Tennessee	Y		
Texas			
Utah			Y
Vermont			
Virginia	Y		
Washington		Y	
West Virginia	Y (4)	Y (4)	
Wisconsin	Y (6)		
Wyoming	Y		

WASTE MANAGEMENT RESPONSIBILITY MATRIX NOTES

Column 1: State Government Has Primary Responsibility for Solid Waste

Column 2: County Government Has Primary Responsibility for Solid Waste

Column 3: Municipal Government Has Primary Responsibility for Solid Waste

Key:
Y = Yes
(1) = Responsibilities are divided: state=regulatory; counties=mandated disposal services; towns=mandated disposal services and optional collection services
(2) = Responsibilities are divided: state=regulatory; counties=operational
(3) = Responsibilites are divided: state=enforcement; towns=disposal
(4) = Responsibilities are divided: state=regulatory; county = implementation and operation
(5) = Counties have 95 percent of responsibilities; towns have remainder
(6) = Regulatory only; no unit of government has operational responsibility for waste management.

Source: Brown, Steven R. (Center for the Environment and Natural Resources), Shelley Dresser-Gagnon (Eastern Regional Conference), and Deborah Gona (Office of Information Services of the Council of State Governments) in cooperation with New York State Legislative Commission on Solid Waste Management Staff, "Solid Waste Programs in the States," *Journal of Resource Management and Technology*, Vol. 15, No. 3, Sept. 1987, pp. 132-144.

PACKAGING RESTRICTIONS MATRIX

	1	2	3
Alabama			
Alaska	X		
Arizona			
Arkansas			
California	X	X	
Colorado			
Connecticut	X	X	X
Delaware	X		
Florida	X	X	X
Georgia			
Hawaii			
Idaho			
Illinois		X	
Indiana			
Iowa	X		
Kansas			
Kentucky			
Louisiana			
Maine	X	X	X
Maryland			
Massachusetts	X		X
Michigan		X	
Minnesota	X	X	X
Mississippi			
Missouri			
Montana			
Nebraska			
Nevada			
New Hampshire			
New Jersey	X		
New Mexico			
New York	X		
North Carolina			
North Dakota			
Ohio			
Oklahoma			
Oregon	X		
Pennsylvania	X		
Rhode Island	X	X	X
South Carolina			
South Dakota			
Tennessee			
Texas			
Utah			
Vermont	X		X
Virginia			
Washington			
West Virginia			
Wisconsin	X	X	
Wyoming			

PACKAGING RESTRICTIONS MATRIX NOTES

Column 1: State Bans Nondegradable Six-Pack Beverage Rings

Column 2: State Requires Labeling of Certain Packaging (to indicate plastic resin type, recyclability, or degradability)

Column 3: Other Packaging Bans or Restrictions (examples: plastic cans, chlorofluorocarbons)

Sources: Environmental Action Foundation, *Solid Waste Legislative Database*, Washington, DC, August and December 1988; and American Paper Institute, "State Solid Waste Issues", Washington, DC, October 6, 1988.

MARKET DEVELOPMENT ACTIVITIES MATRIX

	1	2	3	4	5	6	7
Alabama							
Alaska							
Arizona							
Arkansas							
California		X	X	X	X	X	
Colorado							
Connecticut							
Delaware							
Florida	X						
Georgia							
Hawaii							
Idaho			X				
Illinois	X	X	X		X		
Indiana							
Iowa							
Kansas							
Kentucky	X						
Louisiana							
Maine							
Maryland							
Massachusetts			X	X			
Michigan		X			X		
Minnesota		X	X				
Mississippi							
Missouri							
Montana						X	
Nebraska				X			
Nevada							
New Hampshire						X	
New Jersey	X	X					
New Mexico							
New York		X*	X	X			
North Carolina	X						
North Dakota							
Ohio		X					
Oklahoma							
Oregon	X						X
Pennsylvania		X		X	X		
Rhode Island			X	X			
South Carolina							
South Dakota							
Tennessee							
Texas							X
Utah							
Vermont							
Virginia							
Washington							
West Virginia							
Wisconsin	X	X	X				
Wyoming							

MARKET DEVELOPMENT ACTIVITIES MATRIX NOTES

Major state recycling market development activities:*

Column 1: Tax and Accounting Incentives (commonly in the form of deductions, exemptions, credits, or reduced rates on sales, property, income, or other taxes)

Column 2: Financial Assistance (grant and loan programs to local governments, state agencies, private firms, and/or non-profit organizations)
* = program is stalled

Column 3: Entrepreneurial Development (state actions to stimulate entrepreneurial activity in recycling, including business recruitment, enterprise zones, entrepreneurial grants, and business incubators, which are similar to enterprise zones but on a smaller scale, offering services and facilities at a reduced rate)

Column 4: Technical Assistance (assistance to recycling processors and manufacturers, including labor and management training, marketing assistance, product testing, assistance with permits, export advice, etc.)

Column 5: Promotion and Consumer Education (programs can target individual, commercial, and/or industrial consumers)

Column 6: Market Factor Coordination (actions to stabilize demand and supply of recyclables, i.e. act as clearinghouse for market information, organize sales cooperatives, sponsor materials recovery facilities, enact price supports, etc.)

Column 7: Removal of Barriers (removal of regulatory and other governmental impediments to recycling)

* Many of these programs are new and are being implemented following legislation adopted in mid-1988.

Source: Jerry Powell, ""Market Development Options," (unpublished chapter), Portland, OR, 1988.

STATE PROCUREMENT MATRIX

	1	2	3	4
Alabama				
Alaska	1988	NO		50%
Arizona				
Arkansas				
California	1977/1986*	YES	5% PP	50%
Colorado				
Connecticut	1987/1988	NO	10% PP	--
Delaware				
Florida	1983/1988*	NO	10% PP	--
Georgia				
Hawaii				
Idaho				
Illinois	1986/1988*	YES	--	40%
Indiana				
Iowa	1987	YES	--	--
Kansas				
Kentucky				
Louisiana				
Maine	1987*			
Maryland	1977/1988*	YES/NO	40% SA	80%
Massachusetts	1988*	NO	--	--
Michigan	1971*	YES	50%SA	50%
Minnesota	1980/1987*	NO	--	--
Mississippi				
Missouri	1974/1986*	NO	--	--
Montana				
Nebraska				
Nevada				
New Hampshire	1988	NO	--	50%
New Jersey	1987	NO	10% PP	50%
New Mexico				
New York	1980/1986*/1988*	YES	10% PP	40%
North Carolina				
North Dakota				
Ohio	1980	NO	--	--
Oklahoma	1988	YES	--	--
Oregon	1975	NO	5% PP	50% or 25%*
Pennsylvania	1988	NO	5% PP	*
Rhode Island	1985	NO	5% PP	50%
South Carolina				
South Dakota				
Tennessee				
Texas	1979	YES	--	--
Utah				
Vermont	1987	NO	SA all	50% paper
Virginia				
Washington	1982/1988*	NO	--	50%
West Virginia				
Wisconsin	1988	NO	--	--
Wyoming				

STATE PROCUREMENT MATRIX NOTES

State procurement of recycled products:

Column 1: Year That Legislation Was Passed (*=Amended)

Column 2: Law Targets Paper and Paper Products Only

* MD: the 1988 procurement amendment targets other materials as well as paper.

Column 3: Provisions

PP = Price Preference (Price preferences allow recycled products that cost more than products made of virgin materials to compete in the market place.)

SA = Set Aside (Set asides require that a specific portion of purchases consist solely of products with recycled content. Virgin material products are excluded.)

Column 4: Percentage of Recycled Content (minimum content standards). Recycled content includes both secondary and post-consumer waste.

*OR: 50 percent secondary waste or 25 percent post consumer waste.

*PA: U.S. Environmental Protection Agency (EPA) minimum recycled content standards for paper require 50 percent secondary and post consumer waste.

Sources: Jerry Powell, "Market Development Options," (unpublished chapter), Portland, OR, 1988.

State and Local Procurement of Recycled Products, compiled by Richard Keller, Maryland Energy Office, Div. of Community Assistance, Annapolis, MD; Jery Huntley, Conservatree, Washington, DC; and Nancy VandenBerg, Markets for Recycled Products, New York, NY, 1988.

USED OIL RECYCLING MATRIX

	1#	2	3
Alabama		300	Tuscaloosa, Birmingham
Alaska		*	
Arizona			
Arkansas			
California		1,000	Sunnyvale, Los Altos, Milipitas,
			Santa Monica, Palo Alto
Colorado			
Connecticut	X	43	
Delaware		27	
Florida		300	
Georgia		65	
Hawaii		20	
Idaho		*	
Illinois			Naperville
Indiana			
Iowa		*	
Kansas	X		
Kentucky		100	
Louisiana			
Maine		50	
Maryland		200	
Massachusetts	X	*	
Michigan	X	750	Ann Arbor
Minnesota		*	Minneapolis-St. Paul Metropolitan Area
Mississippi		*	
Missouri		*	Columbia
Montana			
Nebraska			
Nevada		35	
New Hampshire		*	
New Jersey	X	300	Borough of Haddonfield, Mt. Olive
New Mexico		*	
New York			Hamburg
North Carolina		*	Cary
North Dakota			
Ohio			
Oklahoma			
Oregon	X	350	more than 100 communities
Pennsylvania		*	
Rhode Island		41	
South Carolina			
South Dakota			
Tennessee		*	
Texas			
Utah			
Vermont		*	
Virginia		527	In planning stages in Williamsburg
Washington		*	
West Virginia			
Wisconsin		150	
Wyoming		*	

USED OIL RECYCLING MATRIX KEY

Column 1: States With Regulations That Require Used Oil Recycling
* = no state has fully implemented these mandatory requirements

Column 2: Number of Used Oil Recycling Collection Centers (Oct. 28, 1988)
* = states with collection stations but no estimates of numbers

Column 3: Communities Collecting Used Oil at the Curb

Sources: Arner, Robert, *Used Oil Recycling: State and Local Collecting Programs,* Versar, Inc., Springfield, VA, December 8, 1988.
Survey of State Recycling Officials, Renew America, December 1988.

HOUSEHOLD HAZARDOUS WASTE MATRIX

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Alabama																	
Alaska	X							X		X							
Arizona																	
Arkansas																	
California	X		Pe	X		X	X						X			X	
Colorado														X			
Connecticut	X		G,P				X			X	X*						X
Delaware																	
Florida	X		G				X	X		X							
Georgia																	
Hawaii								X		X				X			
Idaho																	
Illinois	X						X			X	X						X
Indiana																	
Iowa	X			X	X		X	X	X						X		
Kansas	X						X	X	X			X					
Kentucky																	
Louisiana																	
Maine																	
Maryland		X															
Massachusetts	X		G,P							X	X*						
Michigan			P				X			X	X*						
Minnesota	X						X	X	X	X							X
Mississippi																	
Missouri	X	X								X							
Montana																	
Nebraska																	
Nevada																	
New Hampshire			G								X	X*					
New Jersey		X												X			
New Mexico																	
New York	X	X	Pe							X	X						
North Carolina		X															
North Dakota																	
Ohio																	
Oklahoma																	
Oregon	X						X										
Pennsylvania	X		P									X*					
Rhode Island								X		X							
South Carolina																	
South Dakota																	
Tennessee																	
Texas	X		P			X											
Utah																	
Vermont			P							X							
Virginia		X															
Washington	X	X	P	X			X										X
West Virginia																	
Wisconsin			G,P				X			X	X			X			
Wyoming																	

HOUSEHOLD HAZARDOUS WASTE MATRIX NOTES

State laws and regulations on household hazardous waste, 1981-88:

Column 1: Law - State laws, or specific household hazardous waste provisions in a comprehensive law, that address household hazardous waste.

Column 2: Study - State-sponsored studies regarding household hazardous waste.

Column 3: Regulation and/or Guidelines (P=Program, G=Grants, Pe=Permanent) - state regulations or guidelines pertaining to the definition and/or management of household hazardous waste.

Column 4: Defines Household Hazardous Waste - formal state definitions of household hazardous waste.

Column 5: Household Hazardous Waste Product Labeling - state regulations or guidelines that pertain to the labeling of hazardous household products.

Column 6: Reduction of Liability - legislation or regulations designed to limit the liability of household hazardous waste program sponsors and managers.

Column 7: State Education Programs - household hazardous waste education programs that are sponsored by state agencies.

Column 8: State-Run Clean-up Programs - household hazardous waste collections that are sponsored, managed and funded by state agencies.

Column 9: Pilot Clean-up Programs - programs held on a one-time basis, often as a precursor to a more permanent state commitment of resources and staff time funded with general revenues.

Column 10: State Legislative Appropriation - general revenue appropriations approved by state legislatures to fund household hazardous waste management efforts.

Column 11: State Matching Grants (* = funded in 1988)- state grants used for local household hazardous waste collections which match the funding commitment of the local sponsors.

Column 12: Use of State Superfund Monies (* = funded in 1988)- state hazardous waste cleanup funds which have been applied to household hazardous waste management.

Column 13: State Solid Waste Superfund Monies - state solid waste cleanup funds which have been applied to household hazardous waste management.

Column 14: EPA Clean-up Grant Funds - regional offices of EPA have provided grant monies that have been used to fund household hazardous waste management.

Column 15: Retail Sales Permit Fee - Iowa requires retail stores that sell hazardous household products to purchase a permit. Revenue generated by permit fees are used to fund household hazardous waste collections.

Column 16: Advisory Committee Report - recommendations and evaluations of household hazardous waste activities by state appointed household hazardous waste advisory committees.

Column 17: Evaluation Report - evaluation reports that were prepared to evaluate state-run pilot projects.

Source: Dana Duxbury & Associates, Andover, MA, November 1988.

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WITH SPECIAL THANKS TO:

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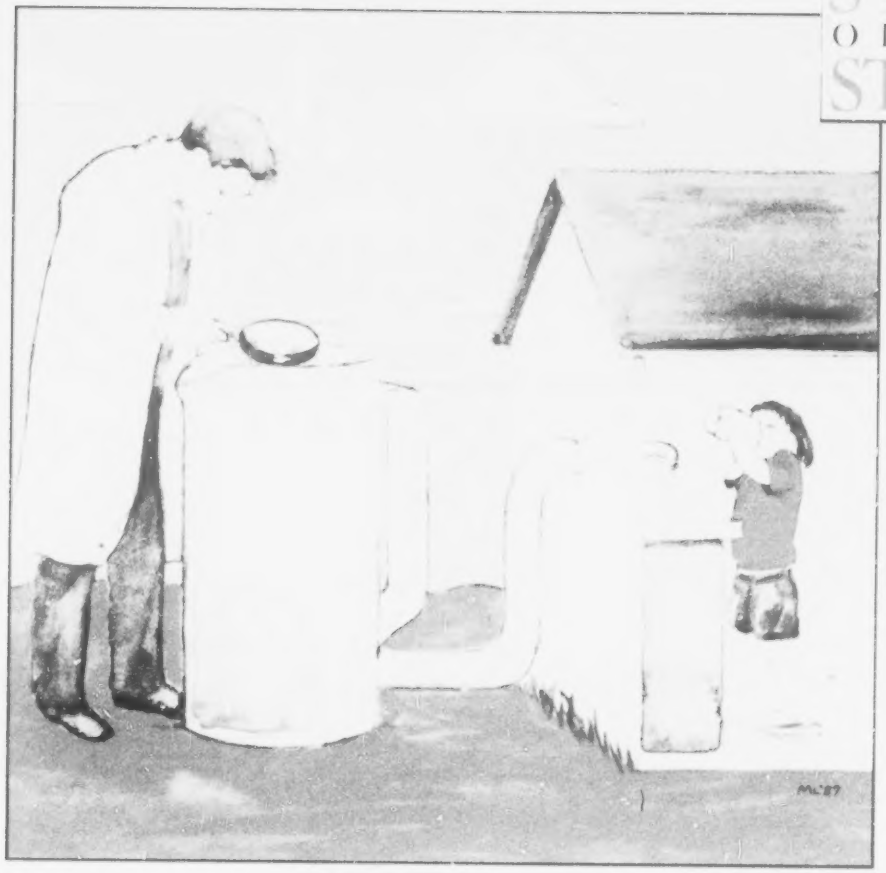

DRINKING WATER

3

FOCUS PAPER

RENEW AMERICA

Drinking Water Focus Paper

by:

Chris Nichols
Renew America
February 1989

Renew America is a non-profit, tax-exempt educational organization working toward a sustainable future by promoting a safe and healthy environment. For further information on Renew America or to obtain additional copies of this report, write to: Renew America, 1001 Connecticut Avenue, N.W., Suite 719, Washington, D.C. 20036, or call (202) 466-6880. See page 27 for ordering information. © Renew America, February 1989.

Introduction

The purpose of the Drinking Water Focus Paper, one of five focus papers designed to supplement the data in the 1989 *State of the States* report, is to provide more detailed information on the status of drinking water quality programs and policies in the 50 states. It provides a national picture of monitoring, inspection, enforcement and water source protection efforts through maps, matrices and explanation of important issues, and it allows comparison of the strength of state programs and policies. It is not intended to be a comprehensive assessment of drinking water quality in each state, but an accurate measure of vital legislation and programs that states have put in place to protect public health and safety at the tap.

Drinking water is one of the most basic—yet, because of the successes of modern water treatment, sometimes forgotten—public health concerns. Growing numbers and quantities of hazardous contaminants have entered water systems, however. Between the passage of the Safe Drinking Water Act (SDWA) in 1974 and its amendments in 1986, more than 2,100 different contaminants were discovered in public drinking water supplies. Forty-eight states are responsible for implementation of SDWA regulations, but nearly half the states took no formal enforcement action in 1987, despite more than 100,000 Safe Drinking Water Act violations that affected more than 41 million Americans. Many states have taken action to protect drinking water supplies at their sources, enacting state legislation to limit contamination of groundwater by agricultural chemicals, leaking underground storage tanks, and other sources, and to control surface water pollution from urban and agricultural runoff. More source protections will be needed to help reduce final water treatment and monitoring costs, which are expected to double or triple in many areas due to the more demanding regulations of the 1986 Safe Drinking Water Act amendments and the 1987 Clean Water Act amendments.

For information beyond the scope of this report, please see the contact list on page 26.

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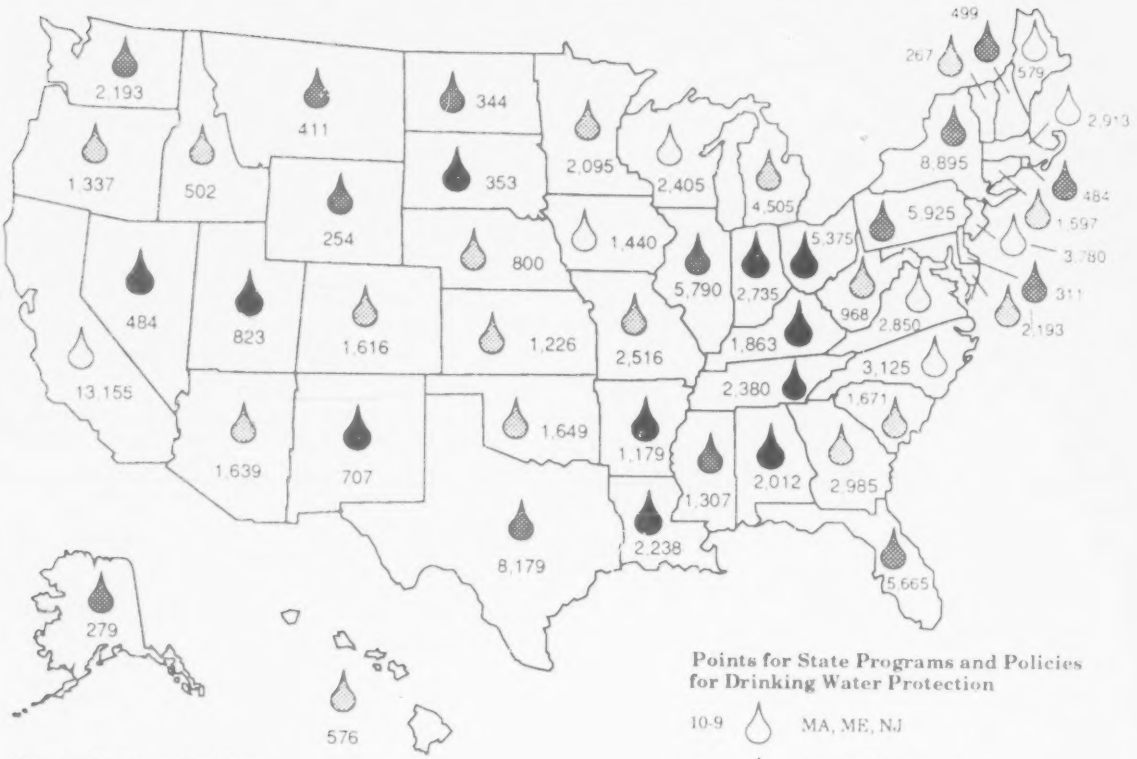
DRINKING WATER CONSUMPTION



Key to Reading the Map

Example: Maine - Best Overall

10 Points for Programs and Policies

579 — 579,000 gallons of drinking water consumed daily

Points for State Programs and Policies for Drinking Water Protection

10-9	MA, ME, NJ
8-7	CA, IA, NC, VA, WI
6-5	AZ, CO, CT, GA, HI, ID, KS, MD, MI, MN, MO, NE, OK, OR, SC, VT, WV
4-3	AK, DE, FL, IL, MS, MT, ND, NH, NY, PA, RI, TX, WA, WY
2-1	AL, AR, IN, KY, LA, NM, NV, OH, SD, TN, UT

Source: Renew America, 1989

DRINKING WATER

Between 1971 and 1985, 111,228 cases of disease from drinking water were reported in the United States, representing more outbreaks than in any 15 year period since 1920. During the same period traces of about 2,100 different chemical contaminants were discovered in public water systems—an ever-lengthening list of industrial and agricultural chemicals in use. The contamination and illnesses have occurred in virtually every region of the country.1

In 1984, residents of a Massachusetts community who had been exposed to drinking water contaminated with industrial chemicals were found to have an increased incidence of leukemia. The following year, the State of California confirmed an unusually high number of miscarriages and birth defects in a community whose drinking water supply had been contaminated when a common industrial chemical leaked from an underground tank. In McKeesport, Pennsylvania an antiquated drinking water system was found in 1983 to be responsible for an outbreak of 349 cases of giardiasis, from an amoeba that causes great intestinal discomfort. In that year alone, 40 outbreaks of waterborne bacteria and viruses caused illness in 21,000 people nationwide.2

Tragically, at the same time an increase in drinking water contamination has been reported, enforcement efforts by states have remained limited. In 1987, 19 states took no formal enforcement action against violators of the federal Safe Drinking Water Act's (SDWA) public health standards or testing and reporting requirements, despite more than 100,000 violations by public water systems affecting 41 million Americans.3

While system violations need to be addressed, many states have moved ahead to protect surface and groundwater supplies at their source. Some have developed strong groundwater protection programs—Arizona, California, Florida, Iowa, New York, and Wisconsin, for example. Twenty-five states have developed numerical groundwater quality standards. And many states are strengthening programs to control pollution from particular sources, including underground storage tanks, pesticides, waste disposal, and waste discharges and runoff into surface waters. Still others, including Nebraska and New Mexico, and cities such as Los Angeles and Boston, emphasize water supply planning as an aspect of drinking water protection.

But new federal regulatory requirements along with declining federal funding are increasing the pressure on already hard-pressed state water-quality programs as well as on public water supply systems. A recent EPA study projects a funding shortfall that will deepen each year. By the mid-1990s states will need more than $300 million annually in additional revenue in order to maintain their current programs and meet new requirements set by Congress in recent amendments to the Safe Drinking Water Act and the Clean Water Act.4 In 1987, state drinking water program budgets nationwide totaled only $75 million.

The rising costs of protecting water quality are leading to a crisis. One EPA official has noted that while the problem is urgent, states don't seem to realize what's going to hit them when the money runs out.

Public Water Systems

Americans consume an estimated 119 million gallons of drinking water each day. Half of the U.S. drinking water supply comes from surface waters (lakes and rivers) and half from groundwater (underground aquifers). Eighty-nine percent of the population get their drinking water from the approximately 200,000 "public" water supply systems (which may be either publicly or privately owned), while 11 percent, mainly in rural areas, are served by private wells.

Historically, polluted drinking water was associated with large-scale outbreaks of disease. In New York City, for example, 20,000 people were sickened with cholera in 1908, and more than 500 died annually from water-borne typhoid. When water systems across the United States introduced chlorine treatment into public water during the early years of this century, the incidence of typhoid, cholera, and dysentery from drinking water was dramatically reduced.

During the 1920s the U.S. Public Health Service codified early standards for contaminants in drinking water. Thereafter, water treatment and distribution grew in size but changed little in nature until the early 1970s, when findings of toxic chemicals in drinking water supplies turned public concern from fear of cholera to fear of cancer.

Tests between 1969 and 1972 revealed that New Orleans' public water supply, taken from the Mississippi River, contained 66 different organic chemicals. Tests in Boston, St. Louis, Los Angeles, and other metropolitan areas confirmed that decades of using "dilution as the solution to pollution" via the nation's waterways had resulted in widespread

National Primary Drinking Water Standards

Constituent	Maximum Contaminant Level
Microbiological	
Total coliforms	1 per 100 mL
Turbidity	1-5 tu
Inorganic Chemicals	mg/l
Arsenic	.05
Barium	1.0
Cadmium	.01
Chromium	.05
Lead	.05
Mercury	.002
Nitrate (as N)	10.0
Selenium	.01
Silver	.05
Fluoride	4.0
Organic Chemicals	
Endrin	.0002
Lindane	.004
Methoxychlor	.1
Toxaphene	.005
2,4-D	.1
2,4,5-TP Silvex	.01
Benzene	.005
Carbon tetrachloride	.005
p-Dichlorobenzene	.075
1,2-Dichloroethane	.005
1,1-Dichloroethylene	.007
1,1,1-Trichloroethane	.2
Trichloroethane	.005
Vinyl chloride	.002
Total trihalomethanes (chloroform, bromoform, bromodichloromethane, dibromochloromethane.)	.1
Radionuclides	
Radium 226 & 228 (total)	5 pCi/L
Gross alpha particle activity	15 pCi/L
Gross beta particle activity	4 mrem/yr

Data are given in milligrams per liter (mg/L) unless otherwise specified. (Milligrams per liter = parts per million.) mL = milliliters, tu = units of turbidity, pCi/L = picocurie per liter, mrem = millirem (one thousandth of a rem).

For a complete listing of criteria of the Safe Drinking Water Act amendments of 1986, write to: Criteria and Standards Division, Office of Drinking Water, U.S. Environmental Protection Agency, 401 M St., SW, Washington, D.C. 20460 and ask for ""FACT SHEET: Drinking Water Regulations Under the Safe Drinking Water Act", October 1988.

contamination of drinking water.[5]

Public pressure forced Congress to pass the Safe Drinking Water Act in 1974. The law required EPA to set and enforce national standards for drinking water quality, develop guidelines for treatment of drinking water, set monitoring and reporting requirements for public water systems, and regulate underground injection of wastes.

The SDWA applies to all public water systems, which are divided into two basic categories: community and noncommunity systems. Community systems serve more than 15 connections year-round, or at least 25 year-round residents. In 1987 there were about 60,000 community systems in the United States. Noncommunity systems provide drinking water to travelers or intermittent users. Roughly 140,000 noncommunity systems in hotels, restaurants, campgrounds, service stations or other areas of short-term use serve people on the go. The law leaves private wells unregulated.

Surface Water Protection

Although on average half of U.S. drinking water comes from surface water and half from groundwater sources, rural areas receive about 90 percent of their drinking water from groundwater, and urban areas are largely supplied by surface water.

Surface water protection was strengthened in 1972 with the Clean Water Act, a measure that extended federal jurisdiction to all surface waters in the United States and directed EPA to regulate the amount and types of municipal and industrial discharges into rivers, lakes, and streams. The federal Water Quality Act of 1987, which amended and further strengthened the Clean Water Act, gives substantial responsibility to the states for controlling discharges of toxic substances and for enforcement against persistent polluters. It also authorizes $400 million for a new federal-state program to control non-point source pollution. States developed assessments of their non-point source problems during 1988, as part of a multi-year plan to control polluted runoff from city streets, construction sites, farms, mining operations, and other sources.

Groundwater Protection

In contrast with surface water, there is no comprehensive federal law designed to protect groundwater and no single federal agency oversees groundwater programs. A patchwork of provisions in 16 separate federal statutes grants jurisdiction in an uncoordinated fashion to numerous federal agencies and provides authority for protecting groundwater from some of the main potential pollution sources. Many states have adopted two new groundwater protection programs established by the 1986 SDWA amendments—the Wellhead Protection Program and the Sole-Source Aquifer Demonstration Program.

Two key components of comprehensive groundwater protection programs are source control regulation to prevent leaching by potential pollution sources, and the use of water quality standards as an enforcement tool. Between 1985 and 1987, 28 states passed laws to control leaks from underground storage tanks, in conformity with a new federal regulatory program. Thirteen states enacted laws pertaining to statewide groundwater protection strategies, groundwater classification, or dedicated funds for groundwater cleanup. Arizona's 1986 Environmental Quality Act incorporates a range of regulatory and nonregulatory components into a comprehensive groundwater protection strategy.[6]

Eighteen states have passed laws designed to keep agricultural chemicals out of groundwater. California and Arizona require the submission of data on a pesticide's potential to leach into groundwater, the adoption of numeric water-quality standards, and strict regulation and possible cancellation of the registration of pesticides that are detected in an aquifer. Iowa took a comprehensive but essentially nonregulatory approach with a program of education, research and demonstration projects designed to address groundwater pollution from a range of sources. The $65 million Iowa program is funded in part with fees on pesticides and nitrogen fertilizers. Six states passed laws to regulate chemigation, the practice of applying agricultural chemicals through irrigation systems.[7]

While the federal government sets drinking water standards that apply to all public water systems, federal law does not require the adoption of ambient water quality standards for groundwater. Twenty-five states have, on their own, developed numerical groundwater quality standards that set upper limits of allowable concentrations of various contaminants. Some states use narrative groundwater-quality standards without specific numerical values. As one component of a comprehensive approach, standards can be used as a trigger for regulatory enforcement action to control pollution sources and prevent human exposure to contaminated groundwater. However, standards alone do not serve to prevent contamination. Once a standard has been violated it is too late to prevent contamination.

Limited Enforcement

States have a major responsibility for assuring the safety of public water supplies. Between 1974 and 1986, 48 states—all but Indiana and Wyoming—assumed

DRINKING WATER MAIN MATRIX

	1	2	3	4	5	6	7	8	9
Alabama	2,013	1,049	58 (64) /129(26) / 479(10)	712,764 / 20	374(0) / 1 (0)		1,2,3 / D	690.90	-
Alaska	279	1,550	3(*) /20(*) / 478(*)	251,849 / 95	6232(0) / 357(0)	A	0 / E	1,075.60	-
Arizona	1,640	1,571	31(82) / 44(8) / 701(10)	2,027,852 / 69	4472(1.25)/ 189(2)	A,B,C,D	0 / D	375.00	P
Arkansas	1,179	2,384	32(51) / 82(23) / 361(26)	137,487 / 8	186(0) / 0(0)	--	1,2,3,4 / D	756.30	-
California	13,155	9,704	370(79) / 18(7) / 3108(5)	1,258,769 / 5	2135(5.48) /88(0)	A,B,D	1,2 / C	9,400.00	P
Colorado	1,616	1,708	6(82) / 50(9) / 655(9)	74,595 / 5	658 (0)/15(10)	A,D	1,4 / D	555.00	-
Connecticut	1,598	4,395	38(*) / 21(*) / 597(*)	464,513 / 17	137(8.03)/8(0)	A,C,D	1,3,4 / A	1,215.50	-
Delaware	311	637	6(78) / 11(14) / 206(17)	40,171 / 10	124 (2.42)/2(0)	A,B	1 / B	631.70	-
Florida	5,665	4,722	182(78) / 159(8) / 1616(14)	1,946,210 / 22	4373(0.09) / 93(0)	A,B,D	0 / B	2,793.90	-
Georgia	2,985	2,800	59(4) / 81(5) / 1381(91)	233,088 / 58	1615 (0.06)/10(0)	A	1,2,3,4 / B	2,400.00	P
Hawaii	577	161	14(86) / 14(7) / 100(7)	67,798 / 6	163(0)/2(0)	B,C,D	1,2,3 / C	918.00	-
Idaho	502	2,588	12 (*) / 28 (*) / 770 (*)	169,582 / 33	1835 (0)/16(9)	A	0 / B	613.70	-
Illinois	5,790	8,965	181(*) / 211(*) / 1560(*)	1,025,459 / 11	1211(0.17)/65(0)	A,B,C	1,2 / B	2,900.00	-
Indiana	2,735	3,765	NA	123,927 / 3	233(3.86)/13(NA)	A,B	1,2 / D	512.40	-
Iowa	1,441	2,172	NA	459,405 / 24	917(13.85)/38(4)	B,C,D	1,2,3,4 / B	740.00	-
Kansas	1,227	1,206	33(*) / 46(*) / 828(*)	313,248 / 16	542(4.06)/15(2)	D	1,2,4 / B	620.00	-
Kentucky	1,863	996	54(67) / 123(21) / 381(12)	465,697 / 18	1011(0)/6(0)	B	1,2,3 / C	1,608.00	-
Louisiana	2,238	2,573	61(75) /107 (10) /1305 (15)	407,386 / 11	446(0) / 5(0)	A,B	4 / D	2,063.10	-
Maine	579	3,164	4(61) / 8(19) / 87(20)	14,339 / 2	86(40.7)/0(0)	A,B,C,D	0 / C	597.50	-
Maryland	2,194	4,584	26(90) / 37(5) / 491(5)	195,871 / 6	135(1.48)/ 5(1)	A,C	1,3 / A	734.60	P
Massachusetts	2,913	2,048	139 (*) / 91 (*) / 346 (*)	1,218,500 / 23	178(1.12)/4(3)	A	0 / C	3,174.00	P
Michigan	4,505	13,275	*(79) / *(11) / *(10)	117,153 / 2	711(0) / 4(2)	A	1,2,3 / C	1,497.60	-
Minnesota	2,095	11,960	62(71) / 71(12) / 867(17)	555,445 / 21	175(0) / 0(0)	A,B,C,D	1,2,3 / B	1,380.00	-
Mississippi	1,308	2,046	9 (*) / 24 (*) / * (*)	624,917 / 28	1239 (0)/3(3)	D	1,2,3 / D	650.00	-
Missouri	2,517	3,017	44(70) / 87(13) / 954(17)	307,115 / 8	534(0) / 12(1)	A	1,2,3,4 / C	1,734.50	-
Montana	412	2,303	3 (*) / 24(*) / 475(*)	129,451 / 31	2517(0) / 10(1)	A,B	1,2,4 / B	500.90	-
Nebraska	801	1,501	19(63) / 27(12) / 630(25)	23,643 / 2	428(0) / 9(0)	A,B,D	1,2,3,4 / C	400.30	-
Nevada	484	739	10(75) / 13(15) / 312(10)	59,040 / 9	431(0.46)/93(0)	--	1,2,3,4 / D	587.00	-
New Hampshire	499	1,596	11(55) / 25(20) / 465(22)	84,669 / 13	197(0)/ 4(0)	A,B	4 / C	650.00	-
New Jersey	3,781	5,070	135(88) / 92(8) / 408(4)	10,731,644/100	14247(3.45) / 4(4)	A,B	1,2,3 / B	3,700.00	-
New Mexico	707	1,343	20(70) / 29(14) / 586(16)	112,660 / 15	605(0.33)/19(0)	A,B	4 / D	456.80	-
New York	8,895	11,617	153(87) / 99(4) / 3111(9)	1,096,115 / 7	1741(0.06)/16(0)	A,D	1,2,4 / C	2,167.00	P
North Carolina	3,125	10,942	61(20) / 146(7) / 2722(63)	560,317 / 16	4357(27) / 30(0)	A,B	1,2,3 / B	2,599.00	-
North Dakota	344	751	10(53) / 12(14) / 340(33)	140,060 / 29	319(1.57)/12(0)	B,D	1,4 / D	471.80	-
Ohio	5,375	10,295	130(81) /152(10) /1348(8)	442,763 / 6	2198 (0)/6(0)	A	1,2,3 / B	2,724.40	-
Oklahoma	1,650	2,599	38(60) / 76(15) / 1218(24)	540,970 / 19	969(4.54)/29(3)	A	4 / C	1,171.50	-
Oregon	1,338	2,933	*(67) / *(15) / *(18)	263,919 / 21	3623(0)/ 26(3)	A,B	1,2,3 / B	1,100.00	-
Pennsylvania	5,925	10,461	136(77)/185(11)/2143(20)	1,980,083 / 33	8856(0.65)/58(11)	--	1,2 / B	4,500.00	-
Rhode Island	484	637	*(92) / *(6) / *(2)	76,375 / 9	12 (0)/ 1(0)	C,D	1,2,3 / C	446.00	-
South Carolina	1,672	2,218	54(66) / 86(17) / 1837(17)	233,175 / 9	266 (1.13)/13(0)	A,D	1,2,3 / D	1,918.90	-
South Dakota	353	894	11(50) / 18(13) / 407(36)	143 ,100 / 26	393(0)/16(0)	A,B	4 / B	412.00	-
Tennessee	2,380	1,537	75(73) / 122(17) / 354(10	225,562 / 9	1618(0.37) / 3(2)	--	1,3 / D	1,088.00	-
Texas	8,179	7,640	199(73)/403(13) /4070(14)	1,929,148 / 13	3397(8.95) / 126(2)	B	4 / E	4,131.60	-
Utah	823	934	39(86) / 39(7) / 335(7)	120,696 / 11	518(0) / 3(0)	B	1,2,3,4 / B	1,114.30	-
Vermont	268	2,045	5(34) / 23(31) / 436(35)	40,251 / 12	283(2.12) / 15(0)	A,B,C	1,3,4 / B	587.90	-
Virginia	2,850	4,768	67(84) / 64(7) / 1437(9)	428,935 / 11	2578 (2.52) / 18(2)	A,B,C	1,2 / A	1,980.00	-
Washington	2,193	4,620	43(71) / 64(10) / 1999(19)	2,017,830 / 58	9668(0) / 440(11)	A,B,C,D	1,3 / C	2,180.00	-
West Virginia	968	2,812	*(48) / *(23) / *(29)	118,727 / 9	369(1.63)/20(11)	A	1,2,3,4 / D	389.20	-
Wisconsin	2,405	15,325	*(70) / *(14) / *(4+)	406,838 / 13	583(1.37) / 26(1)	A,B,C,D	1,2,3 / A	1,564.10	-
Wyoming	255	826	8 (*) / 17 (*) / 300 (*)	91,437 / 43	1361(1.03)/ 9(NA)	A	1,2 / B	NA	-

"primacy" in enforcing federal drinking water requirements. These states developed a program of standard-setting, oversight of public water supply systems, monitoring, inspections, and emergency response that is at least as stringent as EPA's. EPA must approve each state's drinking water program before granting it primacy, and retains oversight authority.

EPA's enforcement data indicate that public water systems frequently violate drinking water quality standards as well as monitoring and reporting requirements. In 1987, 36,763 public water systems nationwide, including 16,250 community systems, were in violation. Forty-one million Americans get their drinking water from these systems.[8]

But formal enforcement action against violators by EPA and the states is rare. EPA defines formal enforcement action to include, for example, compliance orders, administrative penalties, consent decrees, injunctions, show cause hearings, and civil and criminal proceedings. States took such action in only 2,544, or 2.5 percent, of these cases. Only six states—California, Connecticut, Iowa, Maine, North Carolina, and Texas—enforced in more than five percent of such cases.[9]

Given the shortage of resources to deal with the overwhelming number of Safe Drinking Water Act violations, EPA and state enforcement efforts target mainly those systems with the most serious and persistent violations. But even with these 2,097 significant noncomplier systems (SNCs), states took formal enforcement action against only 81, or 4.1 percent, in the 12-month period ending in March 1988. Only seven states—Colorado, Idaho, Massachusetts, Michigan, Mississippi, New Jersey, and West Virginia — took action against 50 percent or more of their SNCs. Twenty-eight states took no enforcement action. Arkansas, Maine, and Minnesota reported they had no systems in significant noncompliance.[10]

Administrative steps to bring systems into compliance include notification letters, site visits, compliance meetings, reminder letters, technical assistance, and other corrective activities. Many states also have programs for training and certification of system operators, grant assistance to systems, and other preventive activities. Drinking water prevention and corrective activities and enforcement rely on adequate funding. State budget amounts vary widely, from $460 per system to more than $7,000.

Aside from the activities of the states, the entire enforcement process is seriously weakened by the lack of standards and testing for many contaminants. By 1987 EPA had set standards—known as primary drinking water standards, or maximum concentration levels —specifying the maximum allowable levels of contamination to protect public health, for only 30 substances. EPA has set no standards for the vast majority of potential drinking water contaminants with known or suspected adverse health effects, and few public water systems are tested for the presence of unregulated chemical pollutants.[11]

Costly New Requirements

With the 1986 amendments to the Safe Drinking Water Act, Congress required EPA to establish primary drinking water standards for an additional 53 contaminants by June 1989. In addition, every three years EPA must develop a list of 25 new contaminants for possible regulation. The amendments also require states or systems to monitor for a large number of

DRINKING WATER MAIN MATRIX KEY

1. Consumption: Number of gallons (in thousands) of drinking water consumed.

2. Public Water Systems: Number of public water systems in each state.

3. Community Systems by Size: Number of large/medium/ small community water systems. Percent of population served by each shown in parentheses. (Large = 10,000 + people served year-round; medium = 3,301 - 10,000; small = 25 - 3,300). NA,*= data not available.

4. Population/Percent of State Population Affected by Safe Drinking Water Act (SDWA) Violations: Number of people affected by community system violations in FY 1987. Percent of state population affected also includes non-community water system violations.

5. Total Violations/ Significant Non-Compliance: Total number of SDWA violations in FY1987 (percent state enforcement action)/ Total number of systems in Significant Non-Compliance with the SDWA in FY1987 (Number of state enforcement actions against SNCs).

6. Groundwater Protections: A= has narrative and/or numeric groundwater standards. Laws passed in 1985–87: B= underground storage tank control; C= statewide strategies, groundwater classification, or groundwater cleanup fund; D= land-use management or control of agricultural chemicals.

7. Surface Water Protections: EPA approval of State programs: 1= National Pollutant Discharge Elimination System permits; 2= state regulation of federal facilities; 3= pretreatment program; 4= construction grant programs; 0= no provisions. /Programs to control nonpoint source pollution of surface water: from A= most comprehensive, to E= least comprehensive.

8. State Drinking Water Budget: Program budgets (in thousands), FY1988, including federal funding to state programs. (Indiana = FY89 data).

9. Water Conservation: Statewide programs, excluding agricultural water use.

For sources, see page 25.

unregulated contaminants. All community systems will have to monitor at least once every five years for a list of substances developed by EPA that are known or suspected to occur in drinking water. The cost of monitoring for a large number of organic chemicals is high.

The lengthening list of regulated contaminants along with stricter, more frequent testing requirements threaten to swamp state drinking water programs. One harried state official says there is little enforcement now because states don't have the money or the people, and that new standards aren't likely to be enforced either.

For small water systems—those serving from a few hundred to a few thousand people—the cost of compliance with the 1986 SDWA amendments may be out of reach. Small systems are often staffed by volunteer operators who do not attend state-sponsored certification programs. According to EPA many small systems operate on annual budgets of less than $5,000. Rural communities, hard-hit by farm foreclosures and Main Street bankruptcies, claim they cannot afford to raise water rates to cover new monitoring and compliance standards.

While the projected annual shortfall in funding needed by states and public water systems in the coming years to implement requirements set by Congress amounts to just a fraction of the cost of a single centralized facility such as a nuclear power plant, or of the $5-6 billion cost of the proposed superconducting super-collider, it appears unlikely that additional federal funds will be forthcoming. Instead, EPA will likely recommend that states pursue "alternative funding mechanisms" to pay for upgrading their drinking water enforcement programs. Alternative funding mechanisms might include reorganizing smaller public water systems into regional water utility districts that would have easier access to low-interest loans from state revolving loan funds, state bond pools, and state-funded bond insurance.

Several states, and municipalities such as Los Angeles, have already instituted such programs. Pennsylvania provides an integrated funding program with an array of options for small-system loans.

Ultimately it is all of us who drink water who will bear the costs of our drinking water supply, whether it is the rising cost of providing safe drinking water or the even greater costs of health risks. But a significant portion of the economic burden must be shifted to polluters. Without adequate enforcement of standards and controls on pollution sources, degradation of our water supplies and an increase in illnesses will continue. Responsibility for enforcement rests with the states. Those with little protection for drinking water must make a significant investment in safeguarding this priceless resource.

DRINKING WATER SNAPSHOT

Maine has the best program overall for drinking water protection, monitoring, and enforcement. With a small staff and a moderate budget, it controls violations and maintains monitoring schedules through clever computer tracking and old-fashioned human vigilance. Maine allowed no community system to fall into significant noncompliance with Safe Drinking Water Act (SDWA) requirements. And noncommunity water systems, which get virtually no attention from EPA or most other states, hold good compliance records in Maine with SDWA regulations.

Like many rural states, Maine invests the bulk of its drinking water budget in training and certification programs for water system operators — the "gatekeepers" of drinking water quality. Because of its small, scattered population and a lack of heavy industry, its surface and groundwater sources remain relatively clean. The state ensures they will remain that way through comprehensive groundwater protections and restrictions on discharges to surface waters.

Currently:

- 19 states take no formal enforcement action against public water systems in violation of the Safe Drinking Water Act. Only six states enforce on more than five percent of violations;
- 28 states take no formal enforcement action against significant noncomplier (SNC) public water systems. Only seven states enforce on 50 percent or more of their SNCs;
- at least 28 states have passed laws to control leaks from underground storage tanks, and at least 18 states have passed laws designed to keep agricultural chemicals out of groundwater;
- 6 states have a statewide water conservation program.

Costs of Some Water Treatment Technologies*

Population Served by Public Water System	Type of Treatment	Cost per Family per Year
501-1,000	conventional co-agulation filtration and disinfection to control microbial contaminants	$125
50,001-75,000		$ 50
>1,000,000		$ 25
501-1,000	corrosion control (stabilization with lime) to control lead and other corrosion products	$ 60
50,001-75,000		$ 15
>1,000,000		<$ 10
501-1,000	packed tower aeration to control organic chemicals	$ 55
50,000-75,000		$ 28
>1,000,000		$ 20
501-1,000	granular activated carbon to control synthetic organic chemicals	$190
50,001-75,000		$130
>1,000,000		$ 40

*Basic assumptions:
— 3.2 persons per household.
— each person using 180 gallons per day.
— total cost per household including operation, maintenance and amortization of capital at10 percent per year for 20 years.

Source: U.S. Environmental Protection Agency; as published by the League of Women Voters Education Fund, *Safety On Tap*, page 39.

The Final Scores

	Percent of Possible Points	*Total Points (out of 50)*	*Rank*	***Drinking Water Points***
California	84	42	1	8
Oregon	78	39	2	5
Minnesota	76	38	3	6
Massachusetts	74	37	4	9
Wisconsin	74	37		7
Iowa	68	34	6	7
New Jersey	68	34		9
Florida	64	32	8	4
Maryland	64	32		6
Connecticut	60	30	10	6
Washington	60	30		3
Maine	**58**	**29**	**12**	**10***
North Carolina	58	29		8
New York	56	28	14	3
Pennsylvania	56	28		3
Rhode Island	56	28		4
Virginia	56	28		7
Georgia	54	27	18	5
Illinois	54	27		4
Vermont	54	27		5
Michigan	52	26	21	5
Idaho	50	25	22	5
Missouri	50	25		5
Ohio	48	24	24	2
South Carolina	48	24		6
Colorado	44	22	26	5
Delaware	44	22		4
Hawaii	44	22		5
New Hampshire	44	22		3
Texas	42	21	30	4
Arizona	40	20	31	6
Kansas	40	20		5
Nebraska	40	20		5
North Dakota	38	19	34	4
Montana	36	18	35	3
Alaska	34	17	36	3
Oklahoma	34	17		5
Alabama	32	16	38	2
Mississippi	32	16		4
New Mexico	32	16		2
Indiana	30	15	41	2
Kentucky	30	15		2
West Virginia	30	15		6
Wyoming	30	15		3
Nevada	28	14	45	1
Arkansas	26	13	46	1
South Dakota	26	13		2
Utah	24	12	48	2
Tennessee	22	11	49	1
Louisiana	20	10	50	1

Key:

Drinking Water Points are based on a scale of 1 to 10. The points were derived from the data in the matrices and measure the strength of state programs and policies to protect the environment. See "Ranking Notes" on page 11 for detailed explanation.

Total Points consist of a maximum score of 50 points. Each of the five topics in the 1989 main report has a maximum value of 10 points. (The five topics are: Forest Management, Drinking Water, Solid Waste Recycling, Food Safety, and Growth and the Environment.) The point values for each topic are added together to give the state's total point score.

Percent of Possible Points indicates each state's total points as a percentage of the total possible points.

Overall Ranking is the ranking of the states based on the total points received for all five topics. In the case of a tie each state is given the same ranking. Example: Both Maine and North Carolina received 29 points and tied for 12th place.

Summary Example: With 29 points, Maine ranks 12th in the nation for the strength of state environmental programs examined. For drinking water protection, Maine received 10 points on a 10 point scale. The 10 points received for drinking water were added to the points received for the remaining four topics to equal the total point score of 29.

* **Maine** was judged to have the strongest programs and policies for drinking water protection and received 10 points (see Drinking Water Snapshot).

Ranking Notes

States have been ranked on the strength of environmental programs and policies on a scale of one to ten. The total rank is the compilation of points for the five topics examined (potential total of 50 points). The rankings are not meant to judge particular environmental conditions in each state, but consider environmental problems as a measure of need for program strength. Key factors weighed against this need are: legislative authority for programs, scope of established programs, extent of funding, monitoring, enforcement, and indications of progress. Although programs mandated by state legislatures, rather than innovative projects, are given greater weight, attention is given to assure that states have not simply "papered-over" a problem with new legislation.

The evaluation is both comparative and subjective and is not intended to represent an absolute scale in which the top state is doing everything possible to protect the environment on a given topic. For some topics, such as solid waste recycling, recent progress is very limited despite a few bright spots. And the overall comparison must also be taken within the general stall in momentum for environmental protection.

The rankings are based on research material and data drawn from a variety of sources: individual telephone and mail surveys of the states; information filed by the states with federal agencies; studies and surveys conducted by academic institutions, private contractors, and national environmental organizations; and information from peer reviewers.

In each case, we have used what we believe to be the best data available and noted the sources in the Matrix Notes. There are still shortcomings, however. Some of the data have a generic quality because of the need to use data in which the same criteria has been applied to all states. At times the most recent data of this type are two or three years old. Another problem is that state-supplied information can have varying levels of accuracy. Where a state is obviously out of line, we have contacted state officials to verify or correct information. A more difficult problem is reluctance of government officials to supply data on enforcement, monitoring, or budgets—which leaves us with record of a program in place, but no measure of its scope or effectiveness. A final shortcoming is the absence of adequate data for all of the states on a given subtopic.

The key indicators used in the ranking are contained in the matrix pages, and in some cases sub-matrices that will be published in a more detailed Focus Paper on each topic. Readers interested in more extensive information on a particular topic, or a state ranking on that topic, should request the appropriate Focus Paper (see inside back cover for ordering information).

Drinking Water

States were ranked on the comprehensive nature of their drinking water programs and policies. Because initial protection of water sources can greatly improve ultimate drinking water quality and reduce treatment costs, the rankings include an assessment of ground and surface water protection programs. State enforcement action against both serious and general violations of the federal Safe Drinking Water Act were used in rankings, as was the size and adequacy of state drinking water program budgets and the existence of statewide water conservation programs.

A number of states devote a large portion of drinking water resources to water system operator training and technical assistance programs. These programs are extremely important to final drinking water quality, but consistent empirical data that might have been used to compare states in these programs was not available.

Text Notes

1. Norman L. Dean, *Danger on Tap: The Government's Failure to Enforce the Federal Safe Drinking Water Act*, National Wildlife Federation, Washington, D.C., October 1988, p. 24; Duff Conacher, *Troubled Waters on Tap: Organic Chemicals in Public Drinking Water Systems and the Failure of Regulation*, Center for Study of Responsive Law, Washington, D.C., January 1988.

2. Jonathan King, "Water, Water, Everywhere: The Poisoning of America's Drinking Water," *Public Citizen*, October 1985; David G. Loveland and Beth Reichheld, *Safety on Tap: A Citizen's Drinking Water Handbook*, League of Women Voters Education Fund, Washington, D.C., 1987, p. 24; Allegheny Co. (PA) Dept. of Health, staff interview, January 10, 1989.

3. Norman L. Dean, *Danger on Tap*, p. 15.

4. EPA, Office of Water, "Paying for Cleaner Water: The State Funding Study," background paper, 1988.

5. Jonathan King, *Troubled Water*, Rodale Press, Emmaus, PA., 1985, p. 112.

6. EPA, Office of Groundwater Protection.

7. EPA, Office of Groundwater Protection.

8. Norman L. Dean, *Danger on Tap*, p. 15.

9. Norman L. Dean, *Danger on Tap*.

10. EPA, Office of Drinking Water, January 1989.

11. Loveland and Reichheld, *Safety on Tap*, pp. 18, 22.

WATER CONSUMPTION MATRIX

	1	2	3	4	5	6	7	8	9	10	11	12
Alabama	3,510	615	28 / 72	515	39	100 / 0	371	65	1,060	7,095	2,012.5	.023
Alaska	348	76	54 / 46	210	9.7	93 / 7	39	31	121	206	279.	.070
Arizona	3,090	618	62 / 38	189	27	96 / 4	476	107	124	5,714	1,639.5	.025
Arkansas	1,680	257	39 / 61	678	60	100 / 0	230	95	172	5,403	1,179.	.020
California	24,300	5,310	70 / 30	2,010	140	89 / 11	3,380	1,270	925	31,475	13,155.	.035
Colorado	3,010	737	12 / 88	222	17	100 / 0	473	120	138	12,643	1,616.	.012
Connecticut	2,680	362	18 / 82	515	39	100 / 0	217	58	139	714	1,597.5	.142
Delaware	514	77	38 / 62	108	10	100 / 0	46	14	36	31	311.	.245
Florida	9,740	1,680	89 / 11	1,590	259	100 / 0	1,460	305	537	3,890	5,665.	.091
Georgia	4,660	836	25 / 75	1,310	99	100 / 0	643	171	740	3,799	2,985.	.056
Hawaii	1,130	204	84 / 16	23	11	100 / 0	143	83	27	1,000	576.5	.046
Idaho	704	212	87 / 13	301	89	85 / 15	289	22	205	21,775	502.5	.002
Illinois	9,830	1,780	26 / 74	1,750	130	100 / 0	981	577	790	11,894	5,790.	.041
Indiana	3,670	575	47 / 53	1,800	139	100 / 0	562	79	2,730	4,666	2,735.	.034
Iowa	2,130	350	74 / 26	751	65	100 / 0	354	42	239	2,112	1,440.5	.052
Kansas	2,000	316	50 / 50	453	42	100 / 0	192	83	122	5,228	1,226.5	.022
Kentucky	2,770	404	12 / 88	956	47	91 / 8	226	35	408	3,493	1,863.	.048
Louisiana	3,900	629	44 / 66	576	46	100 / 0	610	8	2,090	7,155	2,238.	.023
Maine	829	108	22 / 78	329	19	100 / 0	114	40	226	138	579.	.112
Maryland	3,560	771	9 / 91	827	63	100 / 0	428	82	130	477	2,193.5	.196
Massachusetts	5,330	767	24 / 76	496	35	100 / 0	450	514	198	5,089	2,913.	.047
Michigan	7,370	1,250	18 / 82	1,640	123	100 / 0	752	374	1,570	8,685	4,505.	.039
Minnesota	2,700	473	56 / 44	1,490	131	100 / 0	532	49	231	2,234	2,095.	.069
Mississippi	2,260	312	88 / 12	355	16	100 / 0	181	51	255	1,756	1,307.5	.058
Missouri	4,140	645	27 / 73	893	54	100 / 0	408	78	221	5,305	2,516.5	.042
Montana	614	158	39 / 61	209	16	100 / 0	106	29	57	8,421	411.5	.005
Nebraska	1,320	248	84 / 16	281	24	100 / 0	173	51	97	9,719	800.5	.008
Nevada	882	288	33 / 67	86	12	100 / 0	201	61	16	3,424	484.	.013
New Hampshire	637	89	31 / 69	361	22	100 / 0	85	9	254	339	499.	.073
New Jersey	6,710	1,050	39 / 61	851	64	100 / 0	567	151	496	941	3,780.5	.175
New Mexico	1,000	226	88 / 12	414	38	100 / 0	218	49	4	3,011	707.	.021
New York	15,900	2,860	19 / 81	1,890	191	100 / 0	1,660	413	2,050	4,828	8,895.	.099
North Carolina	3,450	595	15 / 85	2,800	169	100 / 0	484	160	542	6,685	3,125.	.040
North Dakota	512	69	43 / 57	176	15	100 / 0	54	15	11	1,072	344.	.030
Ohio	8,900	1,420	28 / 72	1,850	139	100 / 0	606	377	802	10,636	5,375.	.043
Oklahoma	2,830	521	20 / 80	469	26	96 / 4	185	90	310	593	1,649.5	.140
Oregon	1,940	416	20 / 80	735	80	87 / 13	326	46	346	5,755	1,337.5	.021
Pennsylvania	8,170	1,600	16 / 84	3,680	184	100 / 0	723	214	2,300	10,436	5,925.	.043
Rhode Island	884	116	13 / 87	84	5.6	100 / 0	64	15	37	8	484.	.390
South Carolina	2,520	359	21 / 79	823	62	100 / 0	251	47	1,210	5,229	1,671.5	.025
South Dakota	548	80	81 / 19	158	16	94 / 6	77	32	14	551	353.	.052
Tennessee	3,660	627	39 / 61	1,100	70	100 / 0	373	168	1,700	6,147	2,380.	.028
Texas	15,400	2,990	41 / 59	958	105	100 / 0	2,310	130	1,270	15,982	8,179.	.041
Utah	1,570	447	67 / 33	76	6.1	74 / 26	346	50	43	3,708	823.	.020
Vermont	343	53	32 / 68	192	12	100 / 0	46	5	67	8	267.5	.212
Virginia	4,210	579	13 / 87	1,490	112	100 / 0	448	92	633	3,581	2,850.	.060
Washington	3,530	955	35 / 65	856	98	100 / 0	614	153	825	5,400	2,193.	.031
West Virginia	1,310	151	25 / 75	626	21	100 / 0	102	22	909	4,382	968.	.018
Wisconsin	3,130	575	48 / 52	1,680	84	100 / 0	253	102	614	5,614	2,405.	.036
Wyoming	329	98	49 / 51	180	13	92 / 8	74	31	15	6,064	254.5	.004

WATER CONSUMPTION MATRIX NOTES

Column 1 - Population served by public water systems (in thousands).

Column 2 - Public freshwater supply, in million gallons per day (Mg/d).

Column 3 - Percent groundwater / percent surface water in freshwater withdrawals for all uses, by volume.

Column 4 - Population served by private wells (in thousands) .

Column 5 - Volume of freshwater, self-supplied withdrawals (for domestic use) in Mg/d.

Column 6 - Percent groundwater/ percent surface water by volume — self-supplied.

Column 7 - Total domestic withdrawals, from public (treated) and self-supplied (generally untreated) sources in millions of gallons per day.

Column 8 - Total commercial withdrawals — public and self-supplied (Mg/d).

Column 9 - Total industrial withdrawals— public and self-supplied (Mg/d), freshwater only.

Column 10 - Total "other" withdrawals, for use in agricultural irrigation, livestock watering, mining, and thermoelectric power processes. Total freshwater withdrawals in Mg/d.

Column 11 -The estimated volume of drinking water consumed each day for drinking and cooking, in thousands of gallons per day. Other domestic uses of water are not included in this figure.

Column 12 - Drinking water as a percent of daily total freshwater consumption from all uses.

Source: Columns 1-10 compiled from U.S. Geological Survey Circular 1004, *Estimated Use of Water in the United States in 1985*, by Wayne Solley, Charles Merk, and Robert Pierce, U.S. Government Printing Office, 1988.

Column 11 estimated at 2 liters freshwater consumption for drinking and cooking per person per day , based on numbers of people served.

Column 12 = (col. 11 / 10) / (columns 7+8+9+10) to show freshwater consumed for drinking and cooking as a percentage of total freshwater withdrawals per day for all uses.

Public Water Systems Matrix

	1	2	3	4	5	6	7	8	9	10
Alabama	3 / 27	55 / 37	129 / 26	321 / 9	158 / 1	3,508,000	671	378	80.4	18.9
Alaska	NA	3 / *	20 / *	55 / *	423 / *	NA	456	1,044	76.5	23.5
Arizona	6 / 64.7	25 / 17	44 / 8.4	162 / 7.1	539 / 2.8	3,087,000	783	788	95.1	4.9
Arkansas	2 / 10.1	30 / 41.1	82 / 22.7	335 / 22.9	26 / 3.2	1,963,000	681	1,703	70	30
California	37 / 61	333 / 18	18 / 7	444 / 3	2664 / 2	27,000,000	3,906	5,798	81	19
Colorado	1 / 49	5 / 33	50 / 9	171 / 7	484 / 2	3,318,000	1,613	965	76	23
Connecticut	6 / *	32 / *	21 / *	58 / *	539 / *	2,700,000	656	3,739	33	67
Delaware	2 / 39	4 / 39	11 / 14	45 / 11	161 / 6	443,000	219	418	98	1
Florida	23 / 38	159 / 40	159 / 8	114 / 5	1502 / 9	11,563,000	2,227	2,495	95	<1
Georgia	--->	59 / 3.9	81 / 5.3	--->	1381 / 90.8	NA	1,558	1,242	91.8	8.2
Hawaii	1 / 54	13 / 32	14 / 7	49 / 6	51 / 1	1,152,000	131	30	84	16
Idaho	1 / *	11 / *	28 / *	100 / *	670 / *	500,000	896	1,692		
Illinois	6 / *	175 / *	211 / *	720 / *	840 / *	NA	1,956	7,009		
Indiana	NA						928	2,837		
Iowa	NA						1,165	1,007	95	5
Kansas	4 / *	29 / *	46 / *	344 / *	484 / *	NA	938	268	69	31
Kentucky	3 / 34	51 / 33	123 / 21	230 / 11	151 / 1	3,226,000	568	428	70	30
Louisiana	61/27	<--/48	107/10	<--/11	1305/4	4,452,000	1,480	1,093	95	5
Maine	<1 / 18	4 / 43	8 / 19	24 / 17	63 / 3	805,000	379	2,785	77	23
Maryland	2 / 73	24 / 17	37 / 4.9	117 / 3.9	374 / 1.4	3,990,000	597	3,987	86	14
Massachusetts	21 / *	118 / *	61 / *	30 / *	346 / *	NA	542	1,506		
Michigan	* / 33	* / 46	* / 11	* / 8	* / 2	6,823,000	1,518	11,757	81	19
Minnesota	2 / 26	60 / 45	71 / 12	350 / 14	517 / 3	3,225,000	1,004	10,956	96.4	3.6
Mississippi	9 / *		24 / *		1355 / *	1,050,000	1,412	634	99	1
Missouri	11 / 53	33 / 17	87 / 13	347 / 15	607 / 2	4,061,000	1,311	1,706	90	10
Montana	NA	3 / *	9 / *	15 / *	475 / 65	NA	713	1,590		
Nebraska	6 / 46	13 / 17	27 / 12	174 / 15	456 / 10	1,252,000	681	820	1	99
Nevada	3 / 75	7 / *	13 / 15	67 / 5	245 / 5	1,000,000	328	411	89	11
New Hampshire	1 / 15	10 / 40	25 / 20	50 / 12	415 / 10	NA	454	1,142		
New Jersey	12 / 45.5	123 / 43	92 / 8	141 / 3	267 / 0.5	6,900,000	631	4,439		
New Mexico	1 / 27	19 / 42.7	29 / 14	108 / 10.6	478 / 5.6	1,290,000	639	704	95	5
New York	17 / 65	136 / 22	99 / 4	729 / 7	2382 / 2	16,675,000	3,361	8,256	?	
North Carolina	2 / 7	59 / 13	146 / 7	410 / 37	2312 / 26	4,348,000	2,915	8,027	91	9
North Dakota	-- / 0	10 / 53	12 / 14	107 / 25	233 / 8	535,000	354	397		
Ohio	10 / 46	120 / 35	152 / 10	475 / 7	873 / 1	9,167,000	1,629	8,666	83	17
Oklahoma	3 / 24	35 / 36	76 / 15	393 / 19	825 / 5	2,673,000	1,332	1,267	52	48
Oregon	* / 25	* / 42	* / 15	* / 13	* / 5	2,071,000	1,039	1,894	78	21
Pennsylvania	20 / 46.5	116 / 32.4	185 / 11	542 / 17.6	1601 / 2.3	9,978,000	2,486	7,975	78	22
Rhode Island	* / 28	* / 64	* / 6	* / 1	* / 0.6	801,000	86	551	81	19
South Carolina	3 / 23	51 / 43	86 / 17	247 / 12	1590 / 5	2,828,000	979	1,239	89	5
South Dakota	0 / 0	11 / 50	18 / 13	123 / 23	284 / 13	700,000	433	461	86	13.6
Tennessee	4 / 32	71 / 41	122 / 17	237 / 10	117 / <1	3,952,000	549	988	50	50
Texas	2 / 43	197 / 30	403 / 13	1416 / 12	2654 / 2	17,301,000	4,681	2,959	81	19
Utah	4 / 52	35 / 34	39 / 7	123 / 6	212 / 1	1,800,000	413	521	94	6
Vermont	0 / 0	5 / 34	23 / 31	75 / 24	361 / 11	420,253	466	1,579	83	17
Virginia	11 / 56	56 / 28	64 / 7	234 / 6	1203 / 3	4,890,000	1,774	2,994	91	9
Washington	* / 40	43 / 31	64 / 10	255 / 13	1744 / 6	3,825,000	2,355	2,265	94	6
West Virginia	* / 21.7	* / 26.1	* / 23.1	* / 26.3	* / 2.8	1,315,000	811	2,001	70	30
Wisconsin	* / 30.3	* / 39.5	* / 13.9	--->	* / 3.4	3,315,000	1,409	13,916	97	3
Wyoming	0 / *	8 / *	17 / *	--->	300 / *	NA	316	510	78	22

PUBLIC WATER SYSTEMS MATRIX NOTES

Column 1 - Number of Very Large Community Water Systems (those serving more than 100,000 people year-round) / percentage of population they serve.

Column 2 - Number of Large Community Water Systems (those serving between 25,000 and 100,000 people year-round) / percentage of population they serve.

Column 3 - Number of Medium Community Water Systems (those serving between 10,000 and 25,000 people year-round) / percentage of population they serve.

Column 4 - Number of Small Community Water Systems (those serving between 3,300 and 10,000 people year-round) / percentage of population they serve.

Column 5 - Number of Very Small Community Water Systems (those serving between 25 and 3,300 people year-round) / percentage of population they serve.

Column 6 - Total population served by these community water systems.

Column 7 - Total number of community water systems.

Column 8 - Total number of noncommunity water systems.

Column 9 - Percentage of the population served by community water systems that use ground-water as the primary source of drinking water supply.

Column 10 - Percentage of the population served by community water systems that use surface water as the primary source of supply.

NOTE: * = data not available
NA = data not available
"<—" or "—>" indicate that data in this column was combined with data in the column to the right (—>) or left (<—).

Source: Columns 1-6, 9-10: League of Women Voters Education Fund, *State and Community Water Quality Issues Survey, 1988.*

Columns 7 & 8: National Wildlife Federation, *Danger On Tap,* compiled using EPA FRDS Reports No. 31 Community (2/8/88) and Noncommunity (3/18/88).

Drinking Water Violations Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13
Alabama	671 / 378	1,049	219	374	0	1 / 0	531	159	0	0 %	0	11	2.94
Alaska	456 / 1044	1,500	1,182	6,232	0	357 / 0	NA	NA	1	0 %	0	0	0.00
Arizona	783 / 788	1,571	974	4,472	49	189 / 2	232	81	7	1.25 %	0	0	0.00
Arkansas	681 / 1703	2,384	96	186	0	0 / 0	373	NA	2	0 %	0	89	47.85
California	3906 / 5798	9,704	910	2,135	112	88 / 0	1,070	98	5	5.48 %	0	168	7.87
Colorado	1613 / 965	1,708	447	658	0	15 / 10	253	405	0	0 %	0	25	3.80
Connecticut	656 / 3739	4,395	77	137	11	8 / 0	256	5	0	8.03 %	0	20	14.60
Delaware	219 / 418	637	60	124	3	2 / 0	48	84	0	2.42 %	0	119	95.97
Florida	2227 / 2495	4,722	2,034	4,373	4	93 / 0	478	154	0	0.09 %	0	0	0.00
Georgia	1558 / 1242	2,800	1,022	1,615	1	10 / 0	1,920	1,399	0	0.06 %	0	194	12.01
Hawaii	131 / 30	161	38	163	0	2 / 0	276	250	0	0 %	0	128	78.53
Idaho	896 / 1692	2,588	924	1,835	0	16 / 9	407	NA	0	0 %	0	0	0.00
Illinois	1956 / 7009	8,965	598	1,211	1	65 / 0	2,422	154	1	0.17 %	13	208	18.25
Indiana	928 / 2837	3,765	163	233	7	13 / NA	394	NA	2	3.86 %	65	89	66.09
Iowa	1165 / 1007	2,172	561	917	127	38 / 4	NA	919	0	13.9 %	0	32	3.49
Kansas	938 / 268	1,206	315	542	22	15 / 2	1,476	225	0	4.06 %	0	236	43.54
Kentucky	568 / 428	996	270	1,011	0	6 / 0	842	942	0	0 %	0	0	0.00
Louisiana	1480 / 1093	2,573	347	446	0	5 / 0	730	232	2	0 %	0	220	49.33
Maine	379 / 2785	3,164	53	86	35	0 / 0	178	2	0	40.7 %	3	20	26.74
Maryland	597 / 3987	4,584	82	135	2	5 / 1	153	NA	0	1.48 %	0	9	6.67
Massachusetts	542 / 1506	2,048	98	178	2	4 / 3	178	4	0	1.12 %	0	34	19.10
Michigan	1518 / 11757	13,275	486	711	0	4 / 2	403	234	0	0 %	0	26	3.66
Minnesota	1004 / 10956	11,960	125	175	0	0 / 0	245	NA	0	0 %	0	1	0.57
Mississippi	1412 / 634	2,046	551	1,239	0	3 / 3	1,239	NA	0	0 %	0	28	2.26
Missouri	1311 / 1706	3,017	307	534	0	12 / 1	905	118	0	0 %	13	20	6.18
Montana	713 / 1590	2,303	1,225	2,517	0	10 / 1	NA	NA	0	0 %	94	25	4.73
Nebraska	681 / 820	1,501	294	428	0	9 / 0	263	622	1	0 %	0	6	1.40
Nevada	328 / 411	739	250	431	2	93 / 0	NA	329	0	0.46 %	0	79	18.33
New Hampshire	454 / 1142	1,596	122	197	0	4 / 0	149	8	0	0 %	0	0	0.00
New Jersey	631 / 4439	5,070	3,824	14,247	492	4 / 4	2,370	3	0	3.45 %	0	24	0.17
New Mexico	639 / 704	1,343	390	605	2	19 / 0	859	718	0	0.33 %	74	399	78.18
New York	3361 / 8256	11,617	1,026	1,741	1	16 / 0	37	55	0	0.06 %	0	0	0.00
North Carolina	2915 / 8027	10,942	1,024	4,357	1175	30 / 0	17,245	62	5	27.1 %	0	1186	27.22
North Dakota	354 / 397	751	197	319	5	12 / 0	460	473	0	1.57 %	72	64	42.63
Ohio	1629 / 8666	10,295	821	2,198	0	6 / 0	1,795	403	0	0 %	7	477	22.02
Oklahoma	1332 / 1267	2,599	408	969	40	29 / 3	2,037	21	4	4.54 %	0	100	10.32
Oregon	1039 / 1894	2,933	1,551	3,623	0	26 / 3	288	1,431	0	0 %	0	0	0.00
Pennsylvania	2486 / 7975	10,461	4,864	8,856	57	68 / 11	1,953	6,677	1	0.65 %	3	386	4.39
Rhode Island	86 / 551	637	10	12	0	1 / 0	12	16	0	0 %	0	4	33.33
South Carolina	979 / 1239	2,218	137	266	3	13 / 0	284	3	0	1.13 %	0	82	30.83
South Dakota	433 / 461	894	227	393	0	16 / 0	513	12	0	0 %	24	108	33.59
Tennessee	549 / 988	1,537	664	1,618	6	3 / 2	277	1,361	0	0.37 %	0	0	0.00
Texas	4681 / 2959	7,640	1,579	3,397	300	126 / 2	1,265	NA	4	8.95 %	0	0	0.00
Utah	413 / 521	934	313	518	0	3 / 0	230	312	0	0 %	0	77	14.86
Vermont	466 / 1579	2,045	123	283	6	15 / 0	649	NA	0	2.12 %	3	68	25.09
Virginia	1774 / 2994	4,768	708	2,578	65	18 / 2	4,123	653	0	2.52 %	48	273	12.45
Washington	2355 / 2265	4,620	3,077	9,668	0	440 / 11	NA	NA	0	0 %	0	0	0.00
West Virginia	811 / 2001	2,812	149	369	4	20 / 11	608	NA	2	1.63 %	61	3	17.34
Wisconsin	1409 / 13916	15,325	373	583	8	26 / 1	746	184	0	1.37 %	1	73	12.69
Wyoming	316 / 510	826	534	1,361	1	9 / NA	3	7	13	1.03 %	0	0	0.00

DRINKING WATER VIOLATIONS MATRIX NOTES

Column 1 - Number of community / noncommunity public water systems in each state. (These numbers do not include private wells, a domestic drinking water source for roughly 11 percent of Americans. No reliable estimate exists for the number of private wells in each state.)

Column 2 - Total number of public water systems in each state, FY87.

Column 3 - Number of public water systems **with one or more** violations **of Safe Drinking Water Act (SDWA)**, FY87.

Column 4 - Number of violations of SDWA regulations per state, FY87. NOTE: These were the total numbers of violations reported to the EPA in FY87. Because of limited monitoring or failure to report every violation to the EPA, these numbers may be lower than actual violations.

Column 5 - Number of state formal enforcement actions taken on violations.
Formal enforcement actions are those which are legally binding. The data in this column include: administrative and compliance orders, administrative penalties, civil cases filed, consent decrees or consent judgements, default judgements, injunctions, temporary restraining orders, preliminary injunctions and criminal cases filed or resolved.

Column 6 - Number of Significant Noncompliers (SNCs)/ number of state formal enforcement actions against SNCs. The EPA targets a small percentage of community system violators (not noncommunity), those in significant, or chronic, noncompliance, for enforcement actions. If action is not taken within six months, these SNCs are moved to an even higher priority for enforcement action, known as the exceptions list.

Column 7 - Number of state nonenforcement administrative actions taken on community water systems in violation of the Safe Drinking Water Act. These actions may consist of notices of violation, public notices and boil water orders, compliance agreements, meetings, site visits, cases under development, compliance achieved without enforcement, cases dropped, hook-up bans, and actions categorized as "intentional no action" or "unresolved matters."

Column 8 - Number of state nonenforcement administrative actions taken against noncommunity water systems that were in violation of the Safe Drinking Water Act.
Notice the difference in activity level between state nonenforcement actions against community and noncommunity systems. In most states the noncommunity systems are a lower priority for enforcement action.

Column 9 - Federal enforcement actions. The Safe Drinking Water Act Amendments of 1986 specify that the federal government will step in to take enforcement action against public water system violations if states delay more than 30 days in taking such action.

Column 10 - Percentage of violations on which formal enforcement action was taken.

Column 11 - Number of notices of violation (a nonenforcement action) issued by states.

Column 12 - Number of notices of violation issued by public water systems.

Column 13 - Percentage of violations in which notice was issued.

Source: National Wildlife Federation, *Danger On Tap*, compiled from EPA FRDS No. 31 Community (2/8/88) and No. 30 Noncommunity (3/18/88); Report No. 20 Community (2/8/88) and Report No. 19-A Noncommunity (3/18/88); Report No. 18 Community (2/8/88) and Noncommunity (3/18/88); and Response to Freedom of Information Act Request RIN 5437-87, received March 3, 1988.

Population Affected by SDWA Violations Matrix

	1	2	3	4	5	6
Alabama	374	712,764	2,913	38/57	1,579,000	648,000
Alaska	6,232	251,849	77,502	NA/ NA	NA	NA
Arizona	4,472	2,027,852	103,553	2 / 14	1,547,000	944,000
Arkansas	186	137,487	-0-	17 / 23	386,000	201,000
California	2,135	1,258,769	71,563	16 / 28	4,115,000	1,769,000
Colorado	658	74,595	70,652	14 / 23	842,000	110,000
Connecticut	137	464,513	380	1 / 13	44,000	9,000
Delaware	124	40,171	12,435	3 / 100	446,000	227,000
Florida	4,373	1,946,210	216,897	60 / 91	7,600,000	6,612,000
Georgia	1,615	233,088	36,799	93 / 59	1,587,000	507,000
Hawaii	163	67,798	2,035	NA / NA	NA	NA
Idaho	1,835	169,582	59,522	6 / 14	271,000	225,000
Illinois	1,211	1,025,459	14,230	58 / 57	7,364,000	2,798,000
Indiana	233	123,927	-0-	83 / 91	3,679,000	2,097,000
Iowa	917	459,405	48,949	93 / 94	2,151,000	1,613,000
Kansas	542	313,248	10,353	88 / 74	1,741,000	905,000
Kentucky	1,011	465,697	36,799	95 / 80	1,674,000	251,000
Louisiana	446	407,386	20,327	31 / 50	1,166,000	688,000
Maine	86	14,339	75	4 / 25	223,000	47,000
Maryland	135	195,871	???	21 / 91	2,557,000	307,000
Massachusetts	178	1,218,500	1,425	1 / 8	99,000	29,000
Michigan	711	117,153	31,464	51 / 61	6,382,000	1,276,000
Minnesota	175	555,445	-0-	62 / 71	2,145,000	1,395,000
Mississippi	1,239	624,917	-0-	24 / 29	653,000	595,000
Missouri	534	307,115	10,793	10 / 9	293,000	94,000
Montana	2,517	129,451	60,532	5 / 9	85,000	30,000
Nebraska	428	23,643	5,150	69 / 74	980,000	764,000
Nevada	431	59,040	18,045	0 / --	--	--
New Hampshire	197	84,669	571	0 / --	--	--
New Jersey	14,247	10,731,644	681,811	13 / 62	2,696,000	1,240,000
New Mexico	605	112,660	33,797	1 / 3	8,000	7,000
New York	1,741	1,096,115	92,321	21 / 37	5,593,000	1,230,000
North Carolina	4,357	560,317	706	66 / 66	2,006,000	300,000
North Dakota	319	140,060	6,740	3 / 6	82,000	42,000
Ohio	2,198	442,763	123,793	60 / 68	6,089,000	2,009,000
Oklahoma	969	540,970	104	33 / 43	501,000	140,000
Oregon	3,623	263,919	143,121	1 / 3	53,000	15,000
Pennsylvania	8,856	1,980,083	737,396	43 / 65	5,093,000	1,273,000
Rhode Island	12	76,375	1,255	1 / 20	63,000	10,000
South Carolina	266	233,175	402	30 / 65	1,353,000	311,000
South Dakota	393	143,100	1,560	10 / 16	156,000	111,000
Tennessee	1,618	225,562	114,816	32 / 34	1,839,000	717,000
Texas	3,397	1,929,148	107,514	67 / 26	1,986,000	874,000
Utah	5,188	120,696	54,759	0 / --	--	--
Vermont	283	40,251	-0-	0 / --	--	--
Virginia	2,578	428,935	51,269	43 / 45	1,182,000	213,000
Washington	9,668	2,017,830	43,045	13 / 33	484,000	310,000
West Virginia	369	118,727	-0-	4 / 7	105,000	1,441,000
Wisconsin	583	406,838	6,569	50 / 69	2,718,000	1,441,000
Wyoming	1,361	91,437	51,408	1 / 4	7,000	3,000

POPULATION AFFECTED BY SDWA VIOLATIONS
MATRIX NOTES

Column 1 - Number of Violations of the Safe Drinking Water Act (SDWA) in public water systems, FY1987. This column shows the total number of violations from both community and noncommunity public water systems in each state.

Public water systems may be cited for violating a number of regulations under the Safe Drinking Water Act. Failure to notify the public of contamination, failure to take action against polluters, failure to correct the contamination within a reasonable time, and failure to report an incident of contamination to the proper authorities may all be causes for violations.

Column 2 - Population affected by violations in COMMUNITY systems, FY87. Community water systems serve at least 15 connections or at least 25 people year-round. There are approximately 60,000 community systems in the United States.

Column 3 - Population affected by violations in NONCOMMUNITY systems, FY87. Noncommunity systems serve travelers or temporary populations— at parks, campgrounds, restaurants, service stations and at some workplaces and schools that have their own water systems. They must also have at least 15 service connections or serve a daily average of 25 or more people.

Because the numbers of people served by noncommunity water systems fluctuates, and because neither states nor the federal EPA devote as many resources to enforcement and monitoring of non-community systems as with community systems, this number is not as precise as the numbers of people affected by community system violations.

Column 4 - Number of counties / percent of counties in state with one or more public water supplies depending on groundwater that is potentially contaminated by agricultural chemicals (pesticides and fertilizers). "Potential" groundwater contamination is determined by a combination of data from monitoring, data on chemical use, and data on hydrogeological vulnerability to contamination.

Column 5 - Persons served by public water supplies in potentially contaminated counties — surface and groundwater sources

Column 6 - Persons served by public water supplies in potentially contaminated counties — groundwater only (a portion of the total number of persons served, listed in column 5).

Source for columns 1-3: National Wildlife Federation, *Danger On Tap*, compiled from EPA FRDS No. 18 Community systems and No. 19 Noncommunity systems.

Source for columns 4 - 6: Elizabeth Nielsen and Linda Lee, *The Magnitude and Costs of Groundwater Contamination From Agricultural Chemicals. USDA* Economic Research Services, Agricultural Economic Report #576.

Groundwater Protection Matrix

	1	2	3	4	5	6	7	8	9	10	11	12
Alabama												21
Alaska									X			22
Arizona	x	x	x			x	x	x	X	X	X	?
Arkansas												
California						x	x	x	X	X	X	?
Colorado						x			X	X	X	20
Connecticut	x			x						X		
Delaware							x			X		
Florida				x			x		X	X	X	22
Georgia								x	X	X	X	22
Hawaii	x		x			x	x					
Idaho									X	X	X	22
Illinois	x		x				x		X	X	X	17
Indiana							x			X		
Iowa	x				x	x	x					
Kansas						x						
Kentucky							x					
Louisiana							x			X		
Maine	x				x	x	x		X			22
Maryland	x							x	X	X	X	14
Massachusetts								x	X	X	X	21
Michigan										X		
Minnesota	x			x		x	x		X	X	X	12
Mississippi							x					
Missouri									X	X	X	17
Montana							x		X	X	X	22
Nebraska						x	x		X	X	X	19
Nevada												
New Hampshire							x		X	X	X	22
New Jersey							x		X	X	X	16
New Mexico							x		X	X	X	11
New York				x				x	X	X	X	16
North Carolina							x		X	X	X	20
North Dakota						x	x					
Ohio										X		
Oklahoma									X	X	X	0
Oregon							x			X		
Pennsylvania												
Rhode Island	x	x	x	x		x						
South Carolina						x			X	X	X	21
South Dakota							x			X		
Tennessee												
Texas							x					22
Utah							x					
Vermont	x	x	x				x			X		
Virginia	x						x		X	X	X	15
Washington	x			x			x			X		
West Virginia										X		
Wisconsin					x	x	x		X	X	X	16
Wyoming									X	X	X	12

GROUNDWATER PROTECTION MATRIX NOTES

NOTE: Columns 1 - 8 comprise a set of actions that state legislatures took between 1985 and 1987 to protect groundwater supplies. Many states acted to protect groundwater through executive order or state agency action; or they enacted protective legislation before 1985. Other types of protective actions are shown in columns 9 - 12.

Column 1- Statewide Strategies. Legislation that requires a state agency or group of agencies to develop a plan to protect groundwater quality from comtamination. States have established different types of "statewide strategies"; those noted here may or may not indicate that a state has developed comprehensive standards for groundwater protection.

Column 2 - Groundwater classification. Legislation that identifies and categorizes groundwater sources by current and projected future uses, and/or by vulnerability to contamination, as a component of groundwater-protection planning. Classification can be used as a planning tool to set water-quality standards, discharge permit requirements, and land-use controls.

Column 3 - Standard setting. Usually, groundwater quality standards which establish maximum allowable levels for certain contaminants. States use narrative or numeric standards, or both. Often, this category of legislation includes design standards for potential sources of groundwater contamination, such as underground storage tanks, drainage pipes, or underground injection wells for disposal of wastes.

Column 4 - Land-Use Management. Planning or regulatory mechanisms that control activities that could contaminate an aquifer, such as large construction or development projects, waste disposal, the use of agricultural chemicals, etc.

Column 5 - Groundwater Funds. State funds set aside for groundwater cleanup.

Column 6 - Agricultural chemicals. Legislation to regulate the use, sale, labeling and disposal of pesticides, and fertilizers, for the purpose of keeping them from contaminating groundwater through leaching or via water wells.

Column 7 - Underground Storage Tanks. The U.S. Environmental Protection Agency estimates that up to a third of the nation's underground steel or concrete tanks that store gasoline, chemicals or hazardous waste leak. These leaks can enter and contaminate aquifers. In response to federal legislative requirements enacted in 1984 many states have passed legislation that establishes criteria for the registration, construction, installation, monitoring, repair, closure, financial responsibility and leaks in these tanks.

Column 8 - Water Use Management. Legislation that establishes groundwater quality as one of the criteria used in water conservation measures.

Column 9 - State numeric standards for ambient groundwater protection (X= yes)

Column 10 - State narrative standards for ambient groundwater protection (X = yes)

Column 11 - Both narrative and numeric standards for ambient groundwater protection (X=yes)

Column 12 - Number of substances on list of EPA primary or secondary standards for which state has a groundwater protection standard.

Source: Columns 1-8 are taken from EPA *Survey of State Groundwater Quality Protection Legislation Enacted From 1985 Through 1987*. EPA 440/6-88-007, October 1988.

Columns 9-12 are taken from U.S. General Accounting Office testimony before the Senate Environment and Public Works Subcommittee on Water Resources, Transportation and Infrastructure, May 17, 1988: "Fighting Groundwater Contamination: State Activities To Date and the Need for More Information From EPA." GAO/T-PEMD-88-7.

Drinking Water Budgets Matrix

	1	2	3	4	5	6	7
Alabama	700,000	645,617	690,900	7	21.7		1,030
Alaska	867,800	769,300	1,075,600	40.4	13.3	75	2,359
Arizona	350,000	350,000	375,000	20	30	50	479
Arkansas	760,250	695,455	756,302	15	17	33	1,111
California	13,900,000	12,300,000	9,400,000	45	15	20	2,407
Colorado	545,900	545,900	555,947	44	18.7	75	344
Connecticut	1,282,530	1,209,597	1,215,480	5	1	37	1,853
Delaware	501,633	590,215	631,744	21	4.8	60	2,884
Florida	2,443,582	2,558,705	2,793,869	23	10	39	1,255
Georgia	2,100,000	2,200,000	2,400,000	NA	NA	25	1,540
Hawaii	479,546	518,777	918,032	9	3.6	68	7,008
Idaho	NA	NA	613,770			57	685
Illinois	2,748,300	2,900,000	2,900,000	NA	NA	38	1,483
Indiana	NO PRIMACY	NA	512,366			0	552
Iowa	NA	498,000	740,000	-->	27	75	635
Kansas	874,000	670,000	620,000	NA	NA	50	661
Kentucky	1,199,105	1,285,620	1,608,008	15	8.4	25	2,831
Louisiana	1,342,564	1,336,616	2,063,165	60	4.9	32	1,394
Maine	552,372	795,089	597,508	50	14.9	56	1,577
Maryland	598,301	689,739	734,565	7	15	58	1,230
Massachusetts	NA	NA	3,174,000			12	5,856
Michigan	1,454,300	1,555,300	1,497,600	46	4	40	987
Minnesota	1,500,000	NA	1,380,000	NA	NA	53	1,374
Mississippi	NA	NA	650,000			75	460
Missouri	1,469,086	1,685,958	1,734,523	NA	NA	35	1,323
Montana	NA	NA	612,341			75	703
Nebraska	NA	NA	400,326			58	588
Nevada	601,263	521,000	587,000	25	6.3	75	1,790
New Hampshire	475,000	625,000	650,000	15?	5?	40	1,432
New Jersey	3,500,000	3,700,000	3700000?	NA	NA	16	5,864
New Mexico	403,200	404,988	456,797	5	25	50	715
New York	NA	NA	2,167,000			75	645
North Carolina	NA	NA	2,599,000			52	892
North Dakota	NA	NA	471,781			72	1,333
Ohio	2,235,487	2,468,553	2,724,352	27	4	38	1,672
Oklahoma	1,150,543	1,139,239	1,171,452	1.4	17	46	879
Oregon	1,100,000	1,100,000	1,100,000	17	17	40	1,059
Pennsylvania	2,335,000	3,400,000	4,500,000	15	13	30	1,810
Rhode Island	449,572	452,504	446,000	33	0.34	75	5,186
South Carolina	1,801,711	1,826,346	1,918,991	21	5.7	20	1,960
South Dakota	NA	NA	412,000			75	951
Tennessee	1,008,200	943,000	1,088,000	15	8.1	36	1,982
Texas	3,654,266	4,475,119	4,131,632	5	2	47	883
Utah	NA	NA	1,114,270			30	2,698
Vermont	631,991	808,418	587,900	22	6	65	1,262
Virginia	1,740,000	1,890,000	1,980,000	0	8.1	40	1,116
Washington	1,396,050	1,610,525	2,180,000	8.2	2.5	34	926
West Virginia	380,000	380,000+	389,177	9.3	5.6	46	480
Wisconsin	1,410,917	1,489,510	1,564,084	37.6	5.8	57	1,110
Wyoming	NO PRIMACY						NA

DRINKING WATER BUDGETS MATRIX NOTES

Column 1 - 1986 state drinking water program budget.

Column 2 - 1987 state drinking water program budget.

Column 3 - 1988 state drinking water program budget.

Column 4 - Percent of 1988 state budget used for monitoring activity *.

Column 5 - Percent of 1988 state budget used for enforcement activity *.

Column 6 - Percent of state drinking water program budget supported by federal funding. (Calculated for most recent state fiscal year reported— in most cases, FY88.) States may obtain up to 75 percent of their total state drinking water program budget from federal funds.

Column 7 - Dollars per community water system, from FY88 state drinking water program budget. This is a simple comparison of total state FY88 budget monies divided by the number of community water systems in the state. Some money will have been allocated to noncommunity system inspection and monitoring, but since this quantity is usually small compared to resources devoted to community systems, this rough calculation provides a fairly accurate spending comparison among states.

* States categorize budget activities differently. In some cases, lab technicians and analyses were included as a "monitoring" activity; in others, training programs for system operators or field inspectors were lumped under the enforcement category. Consequently, these columns reflect the amount of budget money each state reported devoting to these activities, within that individual state's definition of monitoring and enforcement.

NOTE: "—>" or "<—" indicate that data in this column was combined with data in the column to the left or right.

Notes:
a) Maine — monitoring in 1987 included private well testing
b) Missouri total budget includes Regional Office and Public Drinking Water Program.
c) Oregon — received primacy in February 1986. The state legislature allocated $1.1 million total budget for each of the next three years.

Source: League of Women Voters Education Fund, *State and Community Water Quality Issues Survey, 1988;* extensive phone interviews by the author.

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Drinking Water Matrix Notes

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WITH SPECIAL THANKS TO:

SPONSORS

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R 9930-15F 9/89

THE STATE OF THE STATES 1989

FOOD SAFETY

4

FOCUS PAPER

RENEW AMERICA

Food Safety Focus Paper

By:

Lynn Salvo
Renew America
February 1989

Renew America is a non-profit, tax-exempt educational organization working toward a sustainable future by promoting a safe and healthy environment. For further information on Renew America or to obtain additional copies of this report write to: Renew America, 1001 Connecticut Avenue, N.W., Suite 719, Washington, D.C. 20036, or call: (202) 466-6880. See page 32 for ordering information. © Renew America, Feb. 1989.

Introduction

The purpose of the Food Safety Focus Paper, one of five focus papers designed to supplement the data in *The State of the States 1989*, is to provide more detailed information on the status of programs and policies affecting food safety in the fifty states. The focus paper provides a national picture of safety efforts through maps, matrices, and explanation of key issues, and it allows comparison of the strength of state programs and policies. It is not intended to be a comprehensive assessment of the safety of food in each state, but an accurate measure of key legislation and programs that states have put in place that affect the safety of the food we eat.

Each year, foodborne infections kill about 9,000 Americans, contaminated food causes 20-90 million cases of illness, and pesticide contamination of food is estimated to be responsible for up to 20,000 cases of cancer. Many aspects of current conventional food production and processing methods have the potential to negatively affect both the safety of food and the condition of the environment. Policies encouraging alternatives to conventional agriculture such as organic and other sustainable agriculture methods lead to safer food while minimizing resource depletion and environmental degradation. Agricultural runoff of pesticides and fertilizers, along with industrial waste disposal in our waters, jeopardizes fish and shellfish habitat. New food processing technologies such as irradiation also have the potential for adverse effects. Because much responsibility has been shifted from the federal government to the states, public awareness of state progress or relative lack of it is critical. For further information, please see the list of contacts on page 31.

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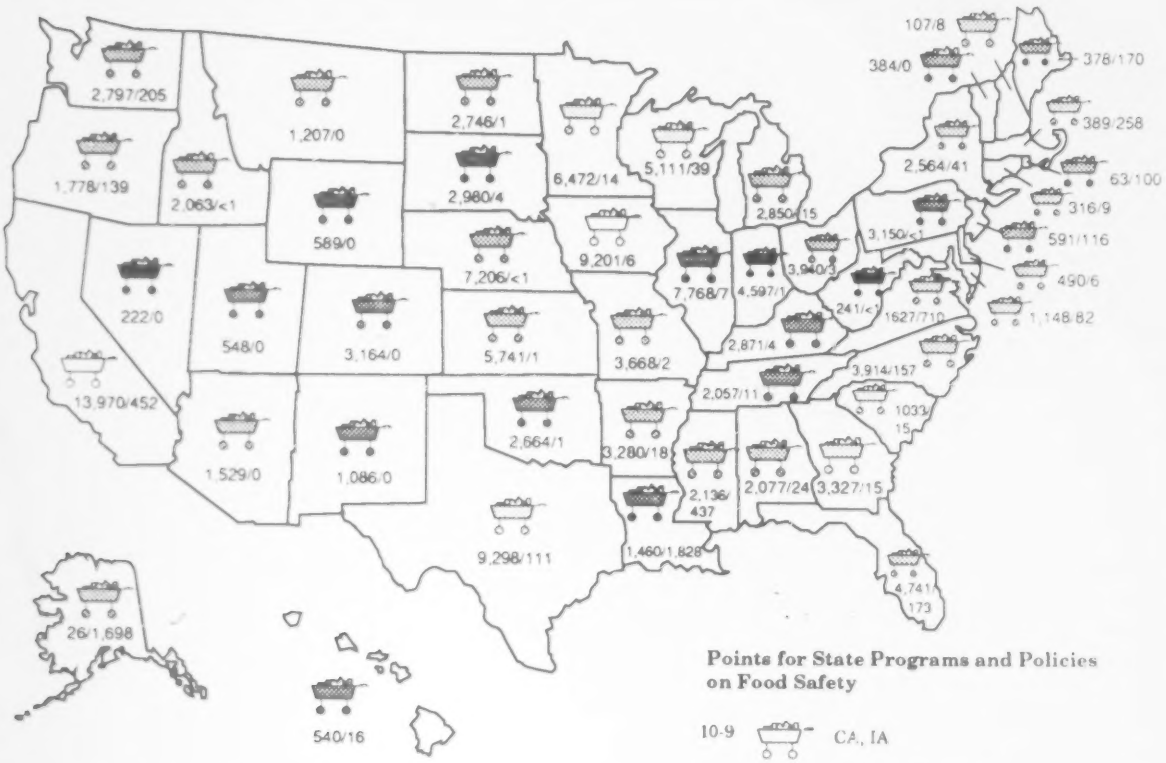
CROPS, LIVESTOCK, POULTRY, FISH, AND SHELLFISH



Key to Reading the Map

Example: Iowa - Best Overall

10 Points for Programs and Policies

9,201/6 $9,201,000,000 cash receipts from crops, livestock, poultry, and livestock and poultry products/ 6,000,000 pounds of commercial landings of fish and shellfish

Points for State Programs and Policies on Food Safety

10-9	CA., IA
8-7	GA, MN, SC, TX, WI
6-5	AK, AL, AR, AZ, CT, DE, FL, ID, KS, MA, MD, MI, MO, MS, MT, NC, ND, NE, NH, NY, OH, OR, VA, WA
4-3	CO, HI, IL, KY, LA, ME, NJ, NM, OK, PA, RI, SD, TN, UT, VT, WY
2-1	IN, NV, WV

Source: Renew America, 1989

FOREWORD

This year's *State of the States* report assesses the progress states have made in five critical environmental protection areas, including for the first time the area of "Food Safety." This joint effort between Renew America and Public Voice for Food and Health Policy is significant because it marks the first collaboration between organizations committed to safe food and a safe environment to assess the progress of states in reducing food hazards related to environmental contamination.

Food is a primary source of delivery of environmental pollutants, yet it is often neglected in discussions of environmental protections. Contaminated food is particularly hazardous because it is spread throughout the population, not just in areas suffering from environmental pollution. In addition, it poses a hidden hazard, unseen and unnoticed, with fancy products in attractive packaging.

Our concern about environmental protection relates to the safety of our food supply in two major ways -- environmental pollutants can contaminate food sources, and chemicals used in food production are themselves sources of environmental pollution.

Today's method of raising food has taken its toll on the environment. "Traditional" farming -- certainly only a tradition since the late 1940's -- has become highly dependent upon agricultural chemicals. Yet the toxic effects of the chemicals go far beyond their intended purposes, spreading through the air, soil and groundwater. And as the insects and weeds become increasingly resistant to the strong chemicals applied on farmland and rangeland, the strength of these dangerous chemicals must continually be increased.

Certainly the premise that these chemicals can be used with no adverse impact on the food produced is no longer widely accepted. Limited though its testing is, the Food and Drug Administration repeatedly finds dangerous levels of pesticides on foods. While being urged to eat greater amounts of fruits and vegetables for a healthy diet, consumers also face the risk of unhealthy levels of agricultural chemicals on these crops.

Another food source promoted as an important element of a healthy diet is fish, a lower-fat protein source. Yet our waterways are not only polluted with agricultural chemicals, but with toxic wastes as well. These chemicals resist degradation, are incorporated into phytoplankton which is the first link in the food chain, and become concentrated in the tissues of fish and shellfish that appear on the dinner table.

Thus the safety of our food supply is clearly threatened by the pollution of our environment. Consumers can rightly be concerned that the abundance of agricultural chemicals and the uncontrolled dumping of toxic wastes are polluting not just the air they breathe and the water they drink, but the food they eat as well.

Pesticides are considered to be among the worst cause of contamination. They pose particular hazard because their very purpose is to alter or kill living organisms. Thus when they pollute groundwater, as well as rivers and streams, the hazard to human health is real.

It is obvious that working for a safe food supply is closely aligned with working for a safe environment and sustainable agriculture. The interdependence of the two lead to an important agenda demanding the attention of consumer and environmental groups at both the state and national levels. Work toward sustaining a healthy food supply includes improvement of food inspection programs, reducing risk from the residues of pesticides, a careful watch over regulation of irradiated foods, and monitoring of developments in biotechnology. We need to work together on the body of information provided in this report to create a safer and healthier food and agriculture system for future generations.

-- **Ellen Haas**
Executive Director
Public Voice for
Food and Health Policy

Food Safety

Scientists at the Centers for Disease Control in Atlanta estimate that foodborne infections kill about 9,000 people nationwide each year. U.S. Food and Drug Administration (FDA) microbiologists estimate that Americans suffer 20-90 million cases of illness due to contaminated food each year. And a two-year study released by the National Academy of Sciences in 1987 concluded that pesticide contamination of U.S. food supplies may be responsible for up to 20,000 cancer cases each year.1

When people get sick from eating contaminated food it is most likely to draw public attention if the source of contamination is clearly identifiable and a large number of people experience severe symptoms. Food contamination made headlines in 1985 when 1,350 people reported symptoms of poisoning after eating California-grown watermelons found to be tainted with the pesticide aldicarb.2

But foodborne illnesses commonly go unreported and their sources remain unidentified. A large percentage of the illnesses are the result of bacteria, viruses, and chemical contamination in meat, poultry, dairy products, and fish. The contaminants produce a number of non-specific symptoms including stomach-ache and diarrhea. Salmonella bacteria alone are responsible for an estimated two to four million food-poisoning cases each year in the United States.

Frequent ingestion of food contaminated with residues of agricultural pesticides or industrial chemicals can increase long-term cancer risk. While our understanding of the cumulative effect of widespread, chronic exposure to low levels of pesticides is incomplete, some pesticides can cause birth defects, mutations, or damage to kidneys, liver, nervous system, or immune system. In a recent assessment EPA ranked pesticide residues in food as the third most important environmental problem in the U.S. in terms of cancer risk.3

Since the passage of the nation's first food safety laws shortly after the turn of the century, the federal government has had primary responsibility for protection of our food supplies. EPA regulates the sale and use of pesticides, and establishes "tolerances" setting the maximum allowable residue levels of each pesticide used in the production of food or animal feed. Federal law requires EPA to balance the health risks of pesticides with their economic benefits in food production.

FDA is charged with conducting nationwide monitoring of samples of food and animal feed shipped in interstate commerce and with enforcing the pesticide residue tolerances. In addition, FDA is responsible for regulating the thousands of additives used in food and must approve new additives before they may be put on the market. The U.S. Department of Agriculture (USDA) is responsible for inspection of meat and poultry and enforcement of federal standards.

Between 1982 and 1985, for example, federal and state monitoring programs detected more than 110 different pesticides in commonly eaten fruits and vegetables.4 Thousands of other compounds not routinely monitored, such as polychlorinated biphenyls (PCBs) and heavy metals, also make their way into the food chain and are often found in meat, poultry, fish and shellfish. Meat and poultry also contain residues of antibiotics and hormones that are administered routinely to animals in the production process. And food industry plans to irradiate foods as a preserving technique raise new concerns.

With substantial gaps in monitoring, increasing contamination of fish and shellfish, and emerging issues such as food irradiation, some states have taken on a growing responsibility to protect food supplies. Especially in the area of reducing pesticide use, states have a vital role to play in promoting sustainable agriculture, Integrated Pest Management (IPM), biological pest controls, and organic farming.

Pesticides

On the 300 million acres of U.S. cropland where food for human consumption and feed grains for animals are cultivated, the use of synthetic pesticides has increased dramatically during the past several decades. According to the most recent estimates of pesticide use, compiled by Resources for the Future, the states with the most pesticide use include Iowa, Illinois, Indiana, Minnesota, Texas, Ohio, Nebraska, Missouri, Kansas, and Wisconsin. These estimates are not comprehensive and do not fully reflect the large-scale use of pesticides on fruit and vegetable crops during multiple growing seasons in California and Florida.

FDA analyzed just 14,492 samples of domestic and imported foods for pesticide residues during fiscal 1987, a tiny fraction of the millions of food shipments nationwide. In addition to compliance sampling done in investigations of cases of suspected contamination, FDA tested 5,659 general surveillance samples of a wide variety of domestically produced commodities, including grains, vegetables,

and fruits. Residues of one or more pesticides were found in 40.2 percent of the samples. In 2.4 percent of the cases the residues were in violation of EPA tolerances. In addition, FDA found pesticide residues in 49 percent of the imported fruit samples it tested, 45 percent of the imported vegetables, and 26 percent of the imported grains and grain products. These figures understate the presence of pesticides in food, since FDA's routine laboratory methods can detect only a portion of the pesticides used on food.[5]

Sustainable Agriculture Alternatives

A few states have begun to play a strong role in reducing contamination of food at the source, by promoting reduced pesticide use. With the high cost of capital-intensive, chemical-intensive, energy-intensive, water-intensive conventional agriculture, a relatively small but growing number of producers in many localities around the country have begun moving to alternatives.

Evidence indicates that alternatives such as low-input agriculture, IPM, biological controls, and organic farming can not only reduce chemical dependency but can be cost-effective as well.

Eight states have sustainable agriculture programs that are either state-funded or coordinated by state employees—California, Iowa, Minnesota, Montana, Nebraska, Ohio, Texas, and Wisconsin. Some of these programs are highly developed, while others are just beginning.

Iowa's Groundwater Protection Act of 1987 established a comprehensive program to promote reduced use of pesticides and synthetic nitrogen fertilizers. The law established and provided funding for the Leopold Center for Sustainable Agriculture, the nation's first and only state center. This law also provided support for an Integrated Farm Management Demonstration Program to encourage adoption of sustainable agriculture methods, and for sustainable agriculture research at Iowa universities. Iowa's program is funded in part by new fees on pesticides and fertilizers.[6]

Minnesota and Wisconsin have established sustainable agriculture programs within their state agriculture departments. Minnesota's program includes on-farm research and demonstrations and a revolving loan fund to aid farmers in making changes in their operations. Wisconsin's program includes a sustainable agriculture demonstration grant program to fund on-farm projects. California supports research, demonstration, planning, and information projects through universities.

Organic farming involves substituting biological pest controls and natural fertilizers for synthetic pesticides and fertilizers. Thirty thousand farms use organic techniques today. The number of organic farms in California reportedly doubled between 1982 and 1985. Fifteen states have enacted laws providing for the labeling of foods as organic. This is especially significant since there is no official federal definition of organically grown food. Three states—Minnesota, Texas, and Washington—have also instituted programs to certify farms as organic.

Biological controls are crucial to any strategy to reduce dependence on pesticides. Biological control refers to the use of predators, parasites, and diseases which attack pests whose suppression is desired, for example the introduction of predatory insects to control the population of other insects, or the conservation of native pest antagonists. USDA has 1989 funding of $85 million for non-chemical pesticide research. California, Florida, and Texas have the largest combined federal and state funding for biological control work at state agricultural experiment stations and cooperating institutions.

Pesticide use can also be reduced through a combination of practices known as IPM. IPM does not exclude the use of chemicals, but integrates their use with non-chemical pest control methods such as biological controls, crop rotation, use of pest-resistant crop varieties, and modified planting and harvesting practices. The IPM strategy is to keep insect and weed populations below a threshold above which crop loss exceeds control costs.

Many states use a portion of their agricultural extension service discretionary funds for IPM. At least seven states specifically earmark funds for IPM programs—California, Connecticut, Delaware, Massachusetts, New Jersey, New York, and Texas.

Meat and Poultry

During the 1970s the Food and Drug Administration found organochlorine pesticides such as DDT and its chemical relatives in 90 percent of meat, fish, poultry, and dairy samples tested.[7] Studies by FDA and USDA in the 1980s indicate that residues of these persistent chlorinated pesticides continue to occur at low levels, especially in foods of animal origin, even though they have not been used in agriculture for more than a decade. USDA's 1986 National Residue Monitoring Program also found arsenic residues in 47 percent of the samples of market hogs and young chickens and turkeys tested.[8]

All meat and poultry that enter interstate commerce must be checked by federal inspectors, while states have the option of either running their own inspection programs for meat and poultry in intrastate commerce or allowing USDA to do the inspections. Twenty-eight states have opted to have their own meat inspection programs, while 24 have done so for poultry. State

FOOD SAFETY MAIN MATRIX I

	1	2	3	4		5	6	7	8	9	10
Alabama	2,077	2.1	5,627	None		X			1,071	564	275
Alaska	26	0.1	-	Limits	84				5	50	
Arizona	1,529	1.5	1,898	Limits	86	X			552	0	478
Arkansas	3,280	5.6	11,938	Major	85	X			3,964	450	494
California	13,970	1.5	9,513	Limits	86	X	P	L		850	6,460
Colorado	3,164	2.1	3,974	Most	81	X			87	9	160
Connecticut	316	0.4	302	Limits	85	X			7	58	273
Delaware	490	1.9	1,179	None					40	55	85
Florida	4,741	1.8	6,638	Limits	85	X			197	66	2,349
Georgia	3,327	1.7	12,761	Limits	79				709	535	816
Hawaii	540	2.0	-	Most	84	X					285
Idaho	2,063	8.2	2,735	None					24	30	545
Illinois	7,768	1.6	40,953	Major	85	X			15,800	0	363
Indiana	4,597	2.4	22,824	Major	78	X			285	0	299
Iowa	9,201	10.4	46,783	Major	85	X	PC	L	855	0	109
Kansas	5,741	6.6	15,234	Major	78	X			14,958	157	268
Kentucky	2,871	3.2	6,562	Limits	79	X			46	5	534
Louisiana	1,460	0.9	9,748	Major	78	X			2,831	176	311
Maine	378	1.1	645	Limits	79	X		L	119	55	118
Maryland	1,148	0.8	3,702	Limits	85	X			654	164	132
Massachusetts	389	0.3	353	None		X		L	11	165	170
Michigan	2,850	1.1	13,744	Major	78	X			288	115	320
Minnesota	6,472	4.4	22,310	Major	84	X	P	LC	1,046	200	409
Mississippi	2,136	3.0	7,173	Major	79				3,192	489	195
Missouri	3,668	2.3	16,321	Major	78	X			145	164	160
Montana	1,207	7.8	5,380	Limits	81	X	P	L	880	98	186
Nebraska	7,206	12.0	18,156	Major	82	X	P	L	558	46	109
Nevada	222	0.6	27	Limits	85	X					
New Hampshire	107	0.5	67	Most	84	X		LC*	8	8	10
New Jersey	591	0.3	1,275	Most	84-85				24	420	149
New Mexico	1,086	1.9	1,382	Major	83	X			49	77	118
New York	2,564	0.4	5,807	Most	80	X			217	403	782
North Carolina	3,914	2.0	10,763	None		X			2,383	193	321
North Dakota	2,746	14.4	8,828	Major	84	X		L	4,308	30	155
Ohio	3,940	1.1	19,908	Most	83/86	X	P		212	70	902
Oklahoma	2,664	3.4	4,968	Major	81	X			153	0	133
Oregon	1,778	3.0	3,258	Most	86	X		L	15	7	488
Pennsylvania	3,150	1.0	7,661	Major	78				92	21	149
Rhode Island	63	0.4	25	None		X			3	0	14
South Carolina	1,033	1.0	5,484	Major	82	X			125	208	306
South Dakota	2,980	15.3	8,105	Major	78			L	1,259	73	21
Tennessee	2,057	1.6	5,480	None		X			270	63	194
Texas	9,298	1.6	20,668	Limits	80	X	P	LC	7,199	500	2,309
Utah	548	1.5	1,097	Most	77	X			2	0	57
Vermont	384	2.7	517	Limits	82	X		L	5	22	
Virginia	1,627	0.9	5,221	None		X			930	0	385
Washington	2,797	2.6	4,280	Limits	85	X		LC	74	10	302
West Virginia	241	0.8	696	None		X			32	0	22
Wisconsin	5,111	4.0	14,106	Most	85	X	P	L	228	0	824
Wyoming	589	1.6	1,471	Major	83	X					81

inspection programs receive half of their funding from the federal government and must be equivalent to the federal program.

The National Academy of Sciences concluded in a 1985 study that, regardless of who does the inspections, the key to minimizing the hazards from chemical residues and infectious agents in meat and poultry "is to control these agents at their point of entry into the food chain, i.e., during the production phase on the farm and in feedlots."[9]

Antibiotics and Hormones

In addition to the contaminants that may bioaccumulate from feed grains, meat and poultry may also contain residues from an assortment of drugs administered to the animals, including antibiotics and hormones. Subtherapeutic doses of antibiotics are used to minimize the spread of diseases among animals raised under factory conditions such as exist in feedlots and to promote growth. The U.S. Office of Technology Assessment estimated in 1987 that feed containing antibiotics is fed to 60 percent of cattle, 90 percent of pigs, 90 percent of calves raised for veal, and almost all poultry.[10]

Since bacteria can develop resistance to antibiotics there is a danger that antibiotics given to animals will lose their effectiveness in treating disease in humans. For this reason the subtherapeutic use of antibiotics in animal feeds has been banned in the United Kingdom, West Germany, Holland, Sweden, Norway, and Denmark.

There have been several legislative attempts to ban the subtherapeutic use of antibiotics in the United States since the late 1970s but none have succeeded. Nor have any of the states legislated such a ban.

Hormones, used to promote rapid growth, raise a similar issue. The European Economic Community adopted a ban on imports of meat from animals raised with synthetic hormones, which went into effect on January 1, 1989.

Legislation was introduced in Wyoming in 1989 to establish a commodity certification program under which a state agency could certify meat to be hormone-free. The legislation is generic and would also allow certification of antibiotic-free meat or organically grown food.

Fish and Shellfish

The issue of chemical contamination is particularly serious for fish and shellfish because they are often at the end of long food chains and can accumulate relatively large amounts of pesticides, industrial chemicals, and toxic metals that pollute lakes, rivers, and coastal waters. A U.S. Fish and Wildlife Service study revealed in 1981 that nearly every fish sample taken contained detectable amounts of chlorinated hydrocarbon pesticides.[11]In addition, raw or spoiled fish containing bacteria, viruses, or natural toxins account for one-fourth of the food poisoning cases reported each year in the U.S.

Yet fish and shellfish are not subject to mandatory federal inspection, unlike meat and poultry. Only 11 percent of the 1987 catch was inspected in a voluntary federal program in which clearly visible hazards were checked.[12] In contrast with the United States, Canada has had a mandatory national inspection program since 1967.

Commercial landings of seafood within the United States vary greatly from state to state due to geography, with Alaska and

MATRIX KEY

BASIC STATE AGRICULTURAL STATISTICS

1. Cash Receipts from Crops, Livestock, Poultry, and Livestock and Poultry Products ($millions): 1986.

2. Farm Product as Percent of Gross State Product: 1986.

PESTICIDES

3. Pesticide Use, Active Ingredient of 25 Pesticides (thousand lbs.): Mid-1980s, accounting for about one-half of cropland pesticide use.

4. Evaluation of State Pesticide Usage Report and Latest Year for which Usage Reported: Report covers pesticide use on (Most) crops or (Major) crops. Report has major limitations (Limits) or there is no report (None). Reports up to 1986 are indicated.

5. Pesticide Residue Testing Authority: X= pesticide residues provision in state food and drug law.

ALTERNATIVES TO CONVENTIONAL AGRICULTURE

6. Sustainable Agriculture Programs: P= Program, C= Center. Programs are either funded or legislated by the state, or their coordinators are state employees.

7. Organic Labeling and Organic Farm Certification: Labeling (L) or certification (C) established by state statute or regulation. * Information received too late for inclusion in the 1989 *State of the States* main report.

8. Cropland Acres Influenced by Integrated Pest Management (IPM) (thousands) : 1987. Blank= No report.

9. State Cooperative Extension Integrated Pest Management Expenditures ($thousands) : 1987. Blank= No report. O= report indicated that no funds were spent on IPM. Number is a total of state cooperative extension discretionary funds and state-earmarked funds.

10. Biological Control Funding ($thousands) : 1986. Sum of state and federal funds spent at state agricultural experiment stations and cooperating institutions.

For sources, see page 30.

FOOD SAFETY MAIN MATRIX II

	11	12	13	14	15	16	17	18		
Alabama	MP	24,459	230	C		AC	P A	62	27	1
Alaska	MP	1,697,547	1,114	C	DOE	AC	P MD	12	2	0
Arizona	MP	0	10			AC	P MDA	345	217	33
Arkansas		18,179	2		1R	AC	PC A	107	45	2
California		451,663	236	NC	3C	AC	PCMDA	2100	822	50
Colorado		0	28			AC	P MD	68	24	4
Connecticut		8,562	301	NC		AC	PCM A	18	6	1
Delaware	MP	6,022		C			P A	24	10	0
Florida	MP	172,734	625	C	DOE	AC	P A	333	86	9
Georgia	M	14,961	3,322	C	1C		P A	151	38	2
Hawaii	MP	16,088	41		DOE	AC	P A	42	0	0
Idaho		420	2				P MDA	50	26	0
Illinois	MP	7,081	42		1C,2CR	AC	P M	102	65	1
Indiana	MP	1,399				AC	PC*M*	34	11	0
Iowa	MP	5,764			DOE	AC	PC DA	86	37	0
Kansas	MP	637	5			AC	P MD	46	12	0
Kentucky		4,105	3			AC	P DA	12	2	0
Louisiana	MP	1,827,586		NC		AC		91	18	3
Maine		170,082	550	NC			P M	23	9	0
Maryland	MP	81,658	62	C		AC	P M	70	24	1
Massachusetts		258,066	609	NC	1CR	AC	PC	69	49	1
Michigan		15,072	80			AC	PCM A	102	35	5
Minnesota		13,730	6			AC	PCMD	152	60	0
Mississippi	MP	436,729	21	C	1CR		PCMDA	43	22	0
Missouri		1,561	16			AC	PCMDA	120	47	0
Montana	MP	0	2			AC	PC A	0	0	0
Nebraska		187				AC	P D	22	10	0
Nevada		0	2			AC		4	2	0
New Hampshire		8,287	27	C		AC		11	5	0
New Jersey		116,141	3,135	NC	3CR,1R	AC	M A	79	25	0
New Mexico	MP	0						25	11	0
New York		40,882	4,422	NC		AC	PCM A	188	65	9
North Carolina	MP	156,608	478	C	1R	AC	PC DA	76	29	0
North Dakota		1,209				AC	PCMD	10	5	0
Ohio	MP	3,217			1C,1CR	AC	PC	89	44	0
Oklahoma	MP	1,329			DOE	**	P MDA	13	8	0
Oregon		138,545	63	NC		AC	PCMDA	95	12	1
Pennsylvania		195	26	C		**		92	29	0
Rhode Island		100,150	2,566	C		AC		12	3	0
South Carolina	MP	15,003	2	C	1CR	AC	PCMDA	36	16	0
South Dakota	M	3,517				A	PC	11	8	1
Tennessee		11,471	18			AC	P A	29	9	0
Texas	MP	111,216	451	NC	1CR	AC	PCM A	283	148	9
Utah	M	0			1CR	AC	P M	5	1	0
Vermont	MP	0	<1			AC	P	16	0	0
Virginia	MP	709,595	1,152	C	1C	AC	P M A	46	20	1
Washington		205,073	350	C	DOE	AC	PCM A	81	30	0
West Virginia	M	54				AC	M*	5	3	1
Wisconsin	MP	38,944	18			AC	PCM	169	100	0
Wyoming	MP	0				AC		0	0	0

Louisiana accounting for 50 percent of the total, including 56 percent of the fish and 29 percent of the shellfish. Together with California, Florida, Massachusetts, Mississippi, Virginia, and Washington they account for 85 percent of the U.S. catch.

In cooperation with the FDA and the shellfish industry, 23 shellfish harvesting states participate in the National Shellfish Sanitation Program (NSSP). In this program FDA evaluates the states' conformity with voluntarily agreed-upon certification requirements. FDA concluded in 1988 that nine states have major shellfish program deficiencies of public health significance.[13] Problems include allowing harvesting in inappropriate areas, poor monitoring of pollution conditions in harvesting areas, and unsanitary conditions at processing facilities.

More than half of the U.S. shellfish harvest comes from states which are not in conformity with the NSSP requirements. In its 1988 report FDA concludes there is growing concern about the quality of state regulation of shellfish harvesting, resulting in large part from inadequate program funding.

To ensure safer fish and shellfish, states must have strong programs to prevent water pollution as well as strong monitoring programs to deal with the problems of contamination due to past practices.

Food Additives

With the assistance of several thousand chemical additives, the food industry has produced a dazzling array of laboratory-designed food products to respond to and shape consumers' desires regarding convenience, variety, appearance, and taste. The average American consumes an estimated five pounds of food additives each year including preservatives, sweeteners, artificial coloring, and artificial flavoring, as well as thickening, stabilizing, leavening, bleaching, and emulsifying agents.[14]

FDA regulates food additives under the Federal Food, Drug, and Cosmetic Act. Under the 1958 Food Additives Amendment to this law FDA must review safety data on each new additive and find that it is safe before the additive can be marketed. Under the Delaney Clause, an additive must be banned if it is found to be an animal carcinogen.

Sulfiting agents are the only food additives now in use that are known to have caused human deaths. These preservatives, which are used to make lettuce look fresher and to mask spoilage in shrimp, cause hypersensitivity reactions in hundreds of thousands of asthmatics. In the early to mid-1980s at least six people, and possibly many more, died from eating restaurant food that had been treated with sulfites.[15]

By 1985 California and Washington, along with Chicago and other local governments, had moved ahead of FDA in responding to public concern by either banning the use of sulfites in restaurants or requiring warning signs when sulfites were added to foods. More recently FDA banned the use of sulfites on most fruits and vegetables sold in restaurants, and labeling is required for sulfites applied in grocery stores and

MATRIX KEY

MEAT, POULTRY, AND FISH AND SHELLFISH

11. State Meat/Poultry Inspection Programs: M= meat, P= poultry.

12. Commercial Landings, Fish and Shellfish (thousand lbs.) : 1987. Distribution among states of some landings is estimated.

13. Fish and Shellfish Program Expenditures ($thousands): 1985-86. This includes expenditures for inspection, monitoring, patrol and relay, survey of harvest waters, etc. for fish and shellfish. A blank indicates that no expenditures were reported.

14. FDA Evaluation of Conformity of State Shellfish Sanitation Program with the Requirements of the National Shellfish Sanitation Program: as of 1988. C= In conformance, NC= Not in conformance.

FOOD PROCESSING

15. Food Irradiation Operations: as of January 1987. These operations irradiate food on a commercial (C) or research (R) basis, or both (CR). DOE= planned U.S. Dept. of Energy food irradiation facility.

16. Food Additive and Color Additive Amendments: State has adopted a Food Additive (A) or Color Additive (C) Amendment to the Basic Food Law. **= Food and color additives are dealt with in a manner other than by an amendment.

RESIDUE MONITORING

17. Contaminants for which State Conducted Testing: 1985-1986. P= Pesticides, C= Industrial Chemicals, M= Heavy Metals, D= Drugs, A= Aflatoxin. A blank indicates that no testing was reported. * Information received too late for inclusion in the 1989 *State of the States* main report.

18. Results of Federal (Food and Drug Administration) Pesticide Monitoring: Number of samples taken in the state/ Number of samples found to contain residues of one or more pesticides/ Number of samples found to contain residues in violation of EPA tolerances. It would not be statistically valid to compute state food contamination rates from these data. 10/1/86-9/30/87. Domestic surveillance samples not including meat and poultry (under USDA jurisdiction).

For sources, see page 30.

in wine.

All but a handful of states have additive provisions in their basic state food and drug laws. Usually these provisions duplicate the requirements of federal law. They allow a state to enforce the federal requirements, rather than relying entirely on FDA's enforcement.

Food Irradiation

The Food Additives Amendment also requires that food irradiation be regulated as an additive. In this controversial process, food is placed in a shielded location and exposed to cobalt-60, cesium-137, or electron beams for the purpose of killing microorganisms and insects in order to reduce spoilage and extend shelf life, and to retard natural growth processes such as potato sprouting.

FDA has so far authorized irradiation of dried herbs and spices, fruits and vegetables, pork, wheat and wheat flour, white potatoes, and dried enzyme preparations. FDA requires labeling with a special logo on whole foods but not on ingredients or spices.

Eighteen operations in 11 states currently irradiate spices on a commercial scale, or for combined commercial and research purposes. The U.S. Dept of Energy provides cesium-137, and cleanup of contamination if required. DOE has $15 million in funding to establish regionally-based food irradiation facilities in six states.

Critics charge that FDA's approval of food irradiation is at best unnecessary and premature—without proper testing procedures. They argue that some studies have found chromosomal abnormalities in children and an increase in tumors in animals fed irradiated food, that irradiation destroys vitamins and other nutrients, and that it may produce new or mutant strains of radiation-resistant bacteria and viruses.[16] Concerns have also been raised about irradiated produce sold without labeling in Latin America and its possible export to the United States.

Maine is the only state that has banned the sale of irradiated food, with a law in effect since 1987, although Congress and at least eight states have seen legislative activity on this issue. A ban passed by New Jersey legislators was vetoed by the governor in 1988.

Many states have programs to test food for residues of various contaminants. In 1985 and 1986, according to reports submitted to FDA, 41 states did at least some testing for pesticide residues, 20 tested for industrial chemicals, 25 for heavy metals, 17 for drugs, and 26 for aflatoxin. The amount of sampling and analysis done varies greatly among the states. Some states, such as California, have extensive monitoring programs.

California also adopted a unique measure for addressing food safety when voters approved Proposition 65, which requires the labeling of products containing chemicals which are believed to cause cancer or birth defects. This law remains controversial—it received strong public support but is opposed by much of the food industry.[17]

States can play an important role in filling gaps in monitoring of the food supply and enforcement of food safety requirements, especially given the limitations of the federal presence. It may be impossible to eliminate food contaminants from all sources, but we can at least do a better job of controlling those from man-made sources, such as by developing alternatives to pesticide-intensive agriculture. Taking these steps will reduce the incidence of illness, cancer, and death, and promote the development of a safer food supply.

Food Safety Text Notes

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2. "Temik Follow-Up", *Re:Sources*, Environmental Task Force, Washington, DC, Winter 1985, p. 4.

3. EPA, *Unfinished Business: A Comparative Assessment of Environmental Problems*, February 1987.

4. Lawrie Mott and Karen Snyder, *Pesticide Alert*, Sierra Club Books, San Francisco, 1987, p. 17.

5. U.S. Food and Drug Administration (FDA), "Residues in Food - 1987", *Journal of the Association of Official Analytical Chemists*, Volume 71, Number 6, November-December 1988, p. 166A.

6. Craig Cramer, "Iowa Taxes Chemicals to Protect Groundwater", *New Farm*, February 1988, pp. 22-23.

7. FDA, "Frequency of Detection of Organochlorines in Foods", *Compliance Progress Evaluation FY 1974, Total Diet Studies.*

8. U. S. Dept. of Agriculture, Food Safety and Inspection Service, *Domestic Residue Data Book - National Residue Program 1986*, p. 53.

9. National Academy of Sciences, National Research Council, *Meat and Poultry Inspection: The Scientific Basis of the Nation's Program*, Washington, DC 1985, p. 6.

10. "Antibiotics in Animal Feed Linked to Human Ills", *New York Times*, February 22, 1987, pp. 1, 29.

11. Andre Carothers, "A Desert of Waters: Toxic Pollution and the Great Lakes", *Greenpeace*, July/August 1988, p. 12.

12. "Fish Inspections at an All-Time Low", *Vegetarian Times*, July 1988.

13. FDA, *Status of State Shellfish Sanitation Programs 1987*, p. i.

14. Michael Jacobson, *The Complete Eaters Digest and Nutrition Scoreboard*, Anchor Press/Doubleday, Garden City, NY, 1985, p. 176.

15. Ibid., p. 337.

16. J. Tevere MacFadyen, "Immortal Shrimp and Other Fruits of the Gamma Ray", *Harrowsmith*, January/February 1986, p. 47.

17. *Washington Post*, July 28, 1988.

The Final Scores

	Percent of Possible Points	*Total Points (out of 50)*	*Rank*	***Food Safety Points***
California	84	42	1	9
Oregon	78	39	2	5
Minnesota	76	38	3	8
Massachusetts	74	37	4	5
Wisconsin	74	37		8
Iowa	68	34	6	10*
New Jersey	68	34		4
Florida	64	32	8	6
Maryland	64	32		6
Connecticut	60	30	10	5
Washington	60	30		6
Maine	58	29	12	4
North Carolina	58	29		6
New York	56	28	14	5
Pennsylvania	56	28		4
Rhode Island	56	28		4
Virginia	56	28		6
Georgia	54	27	18	7
Illinois	54	27		4
Vermont	54	27		4
Michigan	52	26	21	5
Idaho	50	25	22	5
Missouri	50	25		5
Ohio	48	24	24	5
South Carolina	48	24		8
Colorado	44	22	26	4
Delaware	44	22		5
Hawaii	44	22		4
New Hampshire	44	22		5
Texas	42	21	30	7
Arizona	40	20	31	6
Kansas	40	20		5
Nebraska	40	20		5
North Dakota	38	19	34	6
Montana	36	18	35	6
Alaska	34	17	36	5
Oklahoma	34	17		4
Alabama	32	16	38	6
Mississippi	32	16		6
New Mexico	32	16		4
Indiana	30	15	41	2
Kentucky	30	15		4
West Virginia	30	15		2
Wyoming	30	15		3
Nevada	28	14	45	1
Arkansas	26	13	46	6
South Dakota	26	13		4
Utah	24	12	48	3
Tennessee	22	11	49	4
Louisiana	20	10	50	3

Key:

Food Safety Points are based on a scale of 1 to 10. The points were derived from the data in the matrices and measure the strength of state programs and policies to protect the environment. See "Ranking Notes" on page 13 for detailed explanation.

Total Points consist of a maximum score of 50 points. Each of the five topics in the 1989 main report has a maximum value of 10 points. (The five topics are: Forest Management, Drinking Water, Solid Waste Recycling, Food Safety, and Growth and the Environment.) The point values for each topic are added together to give the state's total point score.

Percent of Possible Points indicates each state's total points as a percentage of the total possible points.

Overall Ranking is the ranking of the states based on the total points received for all five topics. In the case of a tie each state is given the same ranking. Example: Both Maine and North Carolina received 29 points and tied for 12th place.

Summary Example: With 25 points, Idaho ranks 22nd in the nation for the strength of state environmental programs examined. For food safety, Idaho received five points on a 10 point scale. The five points received for food safety were added to the points received for the remaining four topics to equal the total point score of 25.

* **Iowa** was judged to have the strongest programs and policies for food safety and received 10 points (see Food Safety Snapshot).

Food Safety Snapshot

Iowa receives ten percent of its income from crops and livestock (4th largest in the United States) and contributes 6 percent of U.S. production of crops and livestock (3rd largest). The state has developed an assortment of programs capable of preventing or reducing food contamination, most notably its sustainable agriculture program. The centerpiece of the program, the Leopold Center for Sustainable Agriculture, derives its funding from the Groundwater Protection Act of 1987 which taxes pesticides and synthetic nitrogen fertilizers. The Act also authorizes continuation of the Integrated Farm Management Demonstration Program, which uses demonstration programs to encourage adoption of sustainable agriculture methods. Fees also fund sustainable agriculture research at Iowa universities. Iowa also has an organic labeling law and monitors food for residues of four major classes of contaminants— pesticides, industrial chemicals, drugs, and aflatoxins.

Currently:

- eight states have sustainable agriculture programs;
- six states have recent pesticide usage reports covering most crops;
- 15 states have organic labeling and three have organic farm certification;
- 24 states have meat and poultry inspection programs and an additional four have meat inspection programs;
- 14 states have shellfish sanitation programs in conformance with the requirements of the National Shellfish Sanitation Program while the programs of nine states are not in conformance;
- 11 states house operations irradiating mainly spices on a commercial basis;
- six states lack food additive and seven lack color additive amendments to their basic food laws; and
- five states tested food for residues of all five major classes of contaminants.

Ranking Notes

States have been ranked on the strength of environmental programs and policies on a scale of one to ten. The total rank is the compilation of points for the five topics examined (potential total of 50 points). The rankings are not meant to judge particular environmental conditions in each state, but consider environmental problems as a measure of need for program strength. Key factors weighed against this need are: legislative authority for programs, scope of established programs, extent of funding, monitoring, enforcement, and indications of progress. Although programs mandated by state legislatures, rather than innovative projects, are given greater weight, attention is given to assure that states have not simply "papered-over" a problem with new legislation.

The evaluation is both comparative and subjective and is not intended to represent an absolute scale in which the top state is doing everything possible to protect the environment on a given topic. For some topics, such as solid waste recycling, recent progress is very limited despite a few bright spots. And the overall comparison must also be taken within the general stall in momentum for environmental protection.

The rankings are based on research material and data drawn from a variety of sources: individual telephone and mail surveys of the states; information filed by the states with federal agencies; studies and surveys conducted by academic institutions, private contractors, and national environmental organizations; and information from peer reviewers.

In each case, we have used what we believe to be the best data available and noted the sources in the Matrix Notes. There are still shortcomings, however. Some of the data have a generic quality because of the need to use data in which the same criteria has been applied to all states. At times the most recent data of this type are two or three years old. Another problem is that state-supplied information can have varying levels of accuracy. Where a state is obviously out of line, we have contacted state officials to verify or correct information. A more difficult problem is reluctance of government officials to supply data on enforcement, monitoring, or budgets— which leaves us with record of a program in place, but no measure of its scope or effectiveness. A final shortcoming is the absence of adequate data for all of the states on a given subtopic.

The key indicators used in the ranking are contained in the matrix pages, and in some cases sub-matrices that will be published in a more detailed Focus Paper on each topic. Readers interested in more extensive information on a particular topic, or a state ranking on that topic, should request the appropriate Focus Paper (see page 32 for ordering information).

Food Safety

Five key areas were assessed in the ranking of programs capable of promoting the production and distribution of safe food: pesticides; alternatives to conventional agriculture; meat, poultry, and seafood; food additives; and residue monitoring.

Contaminated food is regarded in large measure as a symptom and conventional food production methods as one of its major causes. Therefore, considerable weight was assigned to programs which promote alternatives to conventional agriculture: sustainable agriculture programs and centers, organic labeling and farm certification, the extent of acreage influenced by integrated pest management (IPM) practices and funds spent on IPM and biological control.

The state pesticide use report was regarded as an indicator of the state's commitment to awareness of the extent of pesticide use within its borders as well as for its information value for state residue monitoring programs (i.e., as a source of information as to which pesticide residues might be contaminating which foods). Recent and more complete reports were given more weight.

Inspection and monitoring were regarded as institutional safety nets for catching contaminated food. Expenditures on programs designed to assure the safety of seafood landings were considered in proportion to the size of a state's catch. In addition, FDA's evaluation of state shellfish programs was considered. Compensation in ranking was made for states lacking fish and shellfish landings. Finally, lack of authority to test for pesticide residues weighed negatively while more varied and extensive monitoring of residues weighed favorably. Lack of food additive amendments in state laws weighed negatively.

BASIC STATE AGRICULTURAL STATISTICS MATRIX

	1	2	3	4	5	6	7	8
Alabama	2,348	7	2.5	2,077	776	1,301	2.1	49
Alaska	-	-	0.5	26	18	8	0.1	1
Arizona	743	1	3.0	1,529	827	702	1.5	8
Arkansas	7,132	21	5.3	3,280	1,455	1,825	5.6	49
California	5,392	5	3.2	13,970	9,805	4,165	1.5	78
Colorado	5,883	9	2.3	3,164	1,145	2,019	2.1	27
Connecticut	145	5	1.2	316	110	206	0.4	4
Delaware	542	41	1.4	490	137	352	1.9	3
Florida	1,143	3	2.8	4,741	3,726	1,015	1.8	39
Georgia	3,730	10	1.9	3,327	1,600	1,727	1.7	48
Hawaii	87	2	2.9	540	458	83	2.0	4
Idaho	4,229	8	8.1	2,063	1,200	862	8.2	23
Illinois	22,059	61	2.0	7,768	5,704	2,063	1.6	84
Indiana	11,052	48	2.8	4,597	2,869	1,728	2.4	72
Iowa	24,586	68	10.4	9,201	4,390	4,811	10.4	107
Kansas	20,267	38	6.6	5,741	2,478	3,264	6.6	70
Kentucky	5,008	19	4.6	2,871	1,519	1,352	3.2	99
Louisiana	3,931	13	2.4	1,460	968	491	0.9	36
Maine	382	2	2.0	378	127	250	1.1	8
Maryland	1,527	23	1.4	1,148	378	770	0.8	17
Massachusetts	170	3	1.0	389	265	124	0.3	6
Michigan	6,383	17	2.2	2,850	1,619	1,231	1.1	58
Minnesota	19,305	36	7.5	6,472	3,102	3,370	4.4	92
Mississippi	5,065	17	2.9	2,136	1,126	1,010	3.0	45
Missouri	12,601	28	3.5	3,668	1,738	1,930	2.3	114
Montana	9,673	10	10.3	1,207	405	802	7.8	23
Nebraska	16,477	33	9.2	7,206	3,093	4,113	12.0	56
Nevada	582	1	1.1	222	78	144	0.6	2
New Hampshire	110	2	1.4	107	36	71	0.5	3
New Jersey	398	8	1.0	591	447	144	0.3	9
New Mexico	1,007	1	5.5	1,086	369	718	1.9	14
New York	3,642	12	1.2	2,564	719	1,845	0.4	41
North Carolina	4,350	13	2.5	3,914	1,980	1,934	2.0	72
North Dakota	20,163	45	15.3	2,746	2,060	686	14.4	33
Ohio	9,839	37	2.1	3,940	2,430	1,511	1.1	84
Oklahoma	8,515	19	4.1	2,664	938	1,726	3.4	70
Oregon	2,408	4	3.8	1,778	1,156	622	3.0	37
Pennsylvania	4,341	15	1.9	3,150	966	2,184	1.0	57
Rhode Island	13	2	0.5	63	49	13	0.4	1
South Carolina	1,989	10	2.0	1,033	618	415	1.0	26
South Dakota	15,167	31	14.0	2,980	1,076	1,903	15.3	35
Tennessee	4,545	17	3.3	2,057	1,057	1,000	1.6	96
Texas	17,636	10	2.4	9,298	3,857	5,441	1.6	160
Utah	1,090	2	3.0	548	138	409	1.5	14
Vermont	508	8	3.5	384	32	352	2.7	7
Virginia	2,936	11	2.7	1,627	623	1,004	0.9	50
Washington	4,005	9	3.5	2,797	1,865	932	2.6	38
West Virginia	741	5	2.1	241	50	192	0.8	21
Wisconsin	8,773	24	5.2	5,111	1,012	4,100	4.0	81
Wyoming	1,911	3	5.3	589	110	479	1.6	9
Total	304,529			142,105	72,704	69,399		2,176

BASIC STATE AGRICULTURAL STATISTICS
MATRIX NOTES

Column 1 — Area Planted in Principal Crops, 1987 (thousand acres)
Area planted does not include that in fruits, vegetables, and nuts, the U.S. total of which represents an area less than 2% of the total U.S. area planted in principal crops.
Source: "Area Planted and Harvested, Principal Crops by States, 1987, with Comparisons", *Crop Production 1987 Summary*, Agricultural Statistics Board, NASS, USDA.

Column 2 — Area Planted in Principal Crops, 1987, as Percent of Total State Acres
Source for Total State Acres: "Table 1a. Surface area of 1982 nonfederal and Federal land and census water, by State.", *Basic Statistics: 1982 National Resources Inventory*, p. 23, Soil Conservation Service, USDA.

Column 3 — Percent of Employed Civilians in Agriculture, 1987
Source: Table 17. "States: Percent distribution of employed civilians by sex, race, Hispanic origin, and industry, 1987 annual averages", *Geographic Profile of Employment and Unemployment 1987*, Bureau of Labor Statistics, U.S. Department of Labor.

Column 4 — Cash receipts from Crops, Livestock, Poultry, and Livestock and Poultry Products, 1986 ($millions)
Source: Table 12, "States ranked by cash receipts (including Commodity Credit Corporation loans), 1986", *1988 Fact Book of Agriculture*, pp. 36-37, USDA.

Column 5 — Cash receipts from Crops, 1986 ($millions)
Source: See Column 4.

Column 6 — Cash receipts from Livestock, Poultry, and Livestock and Poultry Products, 1986 ($millions)
Source: See Column 4.

Column 7 — Farm Product as Percent of Gross State Product, 1986
Source: Table 2, "Gross Product by Industry, Selected Years, 1963-86", *Survey of Current Business*, May 1988, Volume 68, Number 5, U.S. Department of Commerce, Bureau of Economic Analysis.

Column 8 — Number of Farms, 1987 (thousands)
Source: "Number of Farms and Land in Farms, by States, June 1, 1986-88", *Crop Production, August 1988*, p. A-32, Agricultural Statistics Board, NASS, USDA.

ALTERNATIVES TO CONVENTIONAL AGRICULTURE MATRIX

	1	2	3	4	5	6	7	8	9	10	11	12	13
Alabama						1,071	212	564		914	26	40	275
Alaska						5	39	50		29	0	0	
Arizona						552	80	0		506	5	21	478
Arkansas		X	X			3,964	251	450		2,519	29	115	494
California	P	X	X		X				850				6,460
Colorado		X	X			87	83	9		90	6	30	160
Connecticut						7	50	0	58	2	4	0	273
Delaware		X				40	56	2	53	59	3	5	85
Florida						197	139	66		428	8	50	2,349
Georgia		X				709	413	535		2,815	19	51	816
Hawaii		X											285
Idaho		X				24	24	30		28	1	0	545
Illinois						15,800	244	0		1,500	8	40	363
Indiana		X	X			285	182	0		343	6	12	299
Iowa	P,C	X	X		X	855	232	0		1,650	3	21	109
Kansas		X	X			14,958	177	157		0	7	53	268
Kentucky						46	83	5		250	5	20	534
Louisiana						2,831	160	176		5,475	8	248	311
Maine					X	119	80	55		70	2	5	118
Maryland		X	X			654	79	164		335	14	18	132
Massachusetts		X	X		X	11	30	0	165	159	7	5	170
Michigan						288	214	115		200	28	44	320
Minnesota	P	X	X	X	X	1,046	201	200		2,574	7	96	409
Mississippi						3,192	323	489		4,941	23	305	195
Missouri		X				145	174	164		175	0	21	160
Montana	P	X	X		X	880	77	98		0	5	11	186
Nebraska	P	X	X		X	558	193	46		484	6	49	109
Nevada													
New Hampshire				X*	X	8	50	8		23	1	2	10
New Jersey		X				24	60	70	350	21	14	0	149
New Mexico		X	X			49	60	77		0	3	5	118
New York		X				217	117	3	400	285	14	11	782
North Carolina		X	X			2,383	207	193		1,874	39	100	321
North Dakota		X	X		X	4,308	84	30		28	3	55	155
Ohio	P	X	X			212	204	70		214	7	6	902
Oklahoma		X	X			153	221	0		143	9	7	133
Oregon		X	X		X	15	93	7		7	3	5	488
Pennsylvania		X	X			92	119	21		300	7	0	149
Rhode Island						3	36	0		0	0	0	14
South Carolina		X				125	257	208		470	6	18	306
South Dakota		X	X		X	1,259	78	73		0	3	36	21
Tennessee		X	X			270	182	63		182	100	10	194
Texas	P	X		X	X	7,199	647	0	500	433	30	186	2,309
Utah		X				2	50	0		9	2	0	57
Vermont		X			X	5	39	22		0	1	2	
Virginia		X	X			930	122	0		39	2	11	385
Washington		X		X	X	74	114	10		18	1	2	302
West Virginia		X				32	39	0		3	<1	2	22
Wisconsin	P	X	X		X	228	138	0		3,411	6	16	824
Wyoming		X											81
Total						65,912	6,713	4,230	2,376	33,006	481	1,734	23,625

ALTERNATIVES TO CONVENTIONAL AGRICULTURE MATRIX NOTES

SUSTAINABLE AGRICULTURE (Columns 1-3)

Column 1 — Sustainable Agriculture Programs
P= Program, C= Center
Programs are either funded or legislated by the state, or their coordinators are state employees. Programs vary widely in extent and funding.
Source: Unpublished 50-state survey conducted by Americans for Safe Food; Wava G. Haney, Margaret Krome, and G. W. Stevenson, *Sustainable Agriculture Research Sourcebook: A Compilation of Current Activities on Sustainable Agriculture at U. S. Universities*, Wisconsin Rural Development Center, Inc., Summer 1986; Proceedings of *Sustainable Agriculture in the Midwest, North Central Regional Conference*, March 22, 1988; David Ensign, *Prodigal Crops: A Review of Proposals for Sustaining Agriculture*, December 1988, Midwestern Legislative Conference; staff interviews with state officials and others.

Column 2 — States with Recipients of Low-Input/ Sustainable Agriculture (LISA) Grants
Recipients include individuals in organizations, academic institutions, state agencies, etc.
Source: Patrick Madden, Dixon Hubbard, Paul O'Connell, and Vivian Jennings, *Low-Input / Sustainable Agriculture Research and Education Projects for 1988*, USDA.

Column 3 — States with Non-Governmental Organizations for Sustainable Agriculture
Includes private and non-profit centers and groups. May not be exhaustive.
Source: See Columns 1 and 2.

ORGANIC FARM CERTIFICATION AND FOOD LABELING (Columns 4,5)

Column 4 — Organic Farm Certification
Established by state statute or regulation.
*Information received too late for inclusion in *The State of the States 1989.*
Source: *New Farm*, July-August 1988, p. 24; "States Promote Sustainable Agriculture", *Safe Food Gazette*, Americans for Safe Food, 1988; staff interviews with authors.

Column 5 — Organic Food Labeling
Established by state statute or regulation.
Source: See Column 4.

INTEGRATED PEST MANAGEMENT (IPM) (Columns 6-12)

Column 6 — Cropland Acres Influenced by IPM, 1987 (thousands)

IPM Expenditures, 1987 ($thousands):

Column 7 — Extension Expenditures from Smith-Lever (Federal) funds
Column 8 — State Cooperative Extension Discretionary Funds Used for IPM
Column 9 — Appropriation for IPM in States with Earmarked Funds
Column 10 — Private Funds Paid for IPM Services

IPM Personnel, 1987:

Column 11 — Extension IPM Personnel
Column 12 — Private Pest Management Consultants

Notes for Columns 6-8 and 10-12: Blank= No report. It is possible that some states are overreported due to overlapping of reporting categories. Since definitions of IPM vary somewhat from state to state, these data may not be entirely internally consistent.
Source for Columns 6-8 and 10-12: Data generated by a compilation of IPM database based on Table IV of State Cooperative Extension Service 1987 Annual Reports submitted to USDA Extension Service. Source for Column 9: Staff interviews with IPM coordinators in states with funds earmarked for IPM.

BIOLOGICAL CONTROL FUNDING

Column 13 — Biological Control Funding, 1986 ($thousands)
Sum of state and federal funds spent at state agricultural experiment stations and cooperating institutions.
Source: USDA Cooperative State Research Service, which drew these figures from the Current Research Information System (CRIS) database which is considered unreliable but the best available source.

MEAT AND POULTRY MATRIX

	1	2	3	4	5	6	7
Alabama	1,301	X	X	963	53	93	61
Alaska	8	X	X	350	12	23	
Arizona	702	X	X	432	26	70	31
Arkansas	1,825						147
California	4,165						796
Colorado	2,019						145
Connecticut	206						118
Delaware	352	X	X	248	15	7	9
Florida	1,015	X	X	1,905	135	206	97
Georgia	1,727	X		2,081	130	133	111
Hawaii	83	X	X	890	53	75	2
Idaho	862						59
Illinois	2,063	X	X	2,962	200	445	323
Indiana	1,728	X	X	1,736	109	150	90
Iowa	4,811	X	X	804	44	176	97
Kansas	3,264	X	X	1,066	63	187	69
Kentucky	1,352						173
Louisiana	491	X	X	1,280	107	134	46
Maine	250						41
Maryland	770	X	X	767	46	61	53
Massachusetts	124						178
Michigan	1,231						320
Minnesota	3,370						178
Mississippi	1,010	X	X	911	79	83	32
Missouri	1,930						280
Montana	802	X	X				51
Nebraska	4,113						131
Navada	144						30
New Hampshire	71						28
New Jersey	144						235
New Mexico	718	X	X	278	15	44	27
New York	1,845						594
North Carolina	1,934	X	X	2,126	141	213	77
North Dakota	686						40
Ohio	1,511	X	X	3,632	203	395	154
Oklahoma	1,726	X	X	1,501	93	100	46
Oregon	622						118
Pennsylvania	2,184						655
Rhode Island	13						53
South Carolina	415	X	X	851	56	117	42
South Dakota	1,903	X		303	29	59	19
Tennessee	1,000						192
Texas	5,441	X	X	3,848	252	479	281
Utah	409	X		497	30	35	34
Vermont	352	X	X	209	15	17	17
Virginia	1,004	X	X	1,000	49	21	69
Washington	932						146
West Virginia	192	X		638	37	51	17
Wisconsin	4,100	X	X	1,869	99	317	115
Wyoming	479	X	X	2	12	31	
Total	69,399			33,148	2,103	3,722	6,627

MEAT AND POULTRY
MATRIX NOTES

Column 1 — Cash Receipts from Livestock, Poultry, and Livestock and Poultry Products, 1986 ($millions)
Source: Table 12, "States ranked by cash receipts (including Commodity Credit Corporation loans), 1986", *1988 Fact Book of Agriculture*, pp, 36-37, USDA.

Column 2 — State Inspection Program for Meat
X=State has an inspection program for meat in intrastate commerce.
Source: Table 14: "Dates USDA Assumed Intrastate Inspection", *Meat and Poultry Inspection, 1987*, Food Safety and Inspection Service, USDA, March 1, 1988, p. 20; staff interviews with FSIS officials.

Column 3 — State Inspection Program for Poultry
X=State has an inspection program for poultry in intrastate commerce.
Source: See Column 2.

Column 4 — Federal Funding Assistance for State Inspection Program, 1987 ($thousands)
Source: Table l5: "State Program Data", *Meat and Poultry Inspection, 1987*, Food Safety and Inspection Service, USDA, March 1, 1988, p. 21.

Column 5 — State Inspection Employee Staff, 1987 (person-years)
Source: See Column 4.

Column 6 — Number of State Inspected Plants, 1987
Source: See Column 4.

Column 7 — Number of Federally Inspected Plants, 1987
Source: Table 1: "Federally Inspected Plants by State or Territory", *Meat and Poultry Inspection, 1987*, Food Safety and Inspection Service, USDA, March 1, 1988, pp. 8-9.

FISH MATRIX

	1	2	3	4	5	6	7
Alabama	4,863	<1	207	X	303	562	58
Alaska	1,540,940	27	865		552	1500	2500
Arizona			1	X			
Arkansas	18,156	<1	2		10	57	20
California	343,279	6	102	X	232	476	774
Colorado				X			
Connecticut	5,463	<1		X	17	34	137
Delaware	1,732	<1		X			
Florida	115,297	2	73	X	823	2126	2489
Georgia	1,139	<1	175		78	546	381
Hawaii	14,994	<1	30		11	9	81
Idaho	420	<1	1				
Illinois	7,081	<1	27				
Indiana	1,399	<1		X	48	206	180
Iowa							
Kansas			5		2	2	16
Kentucky	4,015	<1	3	X			
Louisiana	1,638,236	29		X			
Maine	123,431	2	272		50		
Maryland	11,203	0	23	X	258	262	260
Massachusetts	205,649	4	85	X			
Michigan	15,072	<1	80		189	1110	144
Minnesota	13,730	<1	6		90	203	
Mississippi	422,332	7	21	X			
Missouri			12				
Montana			2				
Nebraska							
Nevada							
New Hampshire	6,812	<1	6	X			
New Jersey	34,326	1	1,323				
New Mexico				X			
New York	25,139	<1	1,926		332	996	
North Carolina	114,822	2	173	X	292	1727	323
North Dakota							
Ohio	3,217	<1					
Oklahoma	260	<1					
Oregon	87,003	2	13	X	143	365	92
Pennsylvania	195	<1		X			
Rhode Island	72,097	1		X			
South Carolina	3,963	<1	2		28	132	54
South Dakota							
Tennessee	9,417	<1	18		212	484	242
Texas	4,847	<1	26	X			
Utah					5	5	5
Vermont					2	8	8
Virginia	640,034	11	254		2025	3950	4635
Washington	165,787	3			7	28	16
West Virginia					10	10	10
Wisconsin	38,944	1	18		130	152	
Wyoming							
Other	12,921	<1					
Total	5,708,215	100	5,751				

FISH MATRIX NOTES

Column 1 — Commercial Landings, 1987 (thousand lbs.)
Blank= Landings, if any, included in "Other".
Source: "U.S. Commercial Landings, by States, 1986 and 1987", *Fisheries of the United States, 1987*, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, and interviews with their staff.

Column 2 — Commercial Landings, 1987, as Percent of U.S. Total
Source: Derived from Column 1.

Column 3 — State Expenditures for Programs, 1985-86, ($thousands)
Blank= No expenditures reported.
A few agencies in a few states reported expenditures for a different time period. Not all agencies in all states reported; therefore, expenditures may be underreported.
Source: FDA, Division of Federal-State Relations, unpublished spreadsheet from "State Resource Data Survey" and/or individual data sheets submitted by states from which spreadsheet was compiled. This data is considered imperfect but is the best available. Survey refers to "seafood".

Column 4 — States that sent Seafood Samples to Environmental Microbiology Labs, Fiscal Year 1985
Source: Centers for Disease Control and the Association of State and Territorial Public Health Laboratory Directors, "Table 4-41, IX. Environmental Microbiology, C. Food and Beverage Samples", *Consolidated Annual Report on State and Territorial Public Health Laboratories, Fiscal Year 1985, September 1987*, p. 101.

Laboratory Data (Columns 5-7)

Column 5 — Number of Official Samples Analyzed

Column 6 — Number of Determinations
Determinations are the results of a test such as that for a single residue. There may be several determinations for a single sample.

Column 7 — Analytical Person-Hours

Blank= No data reported.
A few agencies in a few states reported data for another time period. Not all agencies in all states reported; therefore, data may be underreported.
Source for Columns 5-7: See Column 3.

SHELLFISH MATRIX

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Alabama	19,596	2	22	C	80	20	28	83	385	285	27	127	747	104
Alaska	156,607	13	249	C			5	20	15	60	3	1,467	2,019	2,806
Arizona			9				1	7	12	256	38	304	608	152
Arkansas	23	<1										2	10	4
California	108,384	9	134	NC	99	1	151	136	136	408	10	95	285	285
Colorado			28				2	12	11	88		166	709	390
Connecticut	3,099	<1	301	NC	21	79	57	105	146	350		264	1,039	174
Delaware	4,290	<1		C	10	90	15							
Florida	57,437	5	553	C	65	35	192	283	2,992	5,040	3	34	160	61
Georgia	13,822	1	3,147	C	70	30	7	11	45	76		46	276	192
Hawaii	1,094	<1	10				4	111	47	150	24	22	222	422
Idaho			1											
Illinois			15				1							
Indiana														
Iowa														
Kansas														
Kentucky	90	<1	1											
Louisiana	189,350	16		NC	100	0	139							
Maine	46,651	4	278	NC	11	89	191	514	2,107	5,067	13	4,896		1,120
Maryland	70,455	6	39	C	4	96	88	290	192	326		77	154	100
Massachusetts	52,417	4	525	NC	16	84	226	361	4,091	3,734	116	9,849	18,030	7,205
Michigan														
Minnesota														
Mississippi	14,397	1		C	68	32	24	24	48	72		937	937	586
Missouri			3					22	25	100	3			
Montana														
Nebraska														
Nevada			2											
New Hampshire	1,475	<1	21	C	60	40	25	25	75	850		75	117	70
New Jersey	81,815	7	1,812	NC	40	60	84	210	301	35,864	638	785	3,140	4,250
New Mexico							1							
New York	15,743	1	2,496	NC	19	81	225	450	1,200	14,552	508	449	1,147	5,137
North Carolina	41,786	4	305	C	17	83	54	315	797			330	749	18
North Dakota														
Ohio												172	515	1,000
Oklahoma	1,069	<1					1							
Oregon	51,542	4	50	NC	65	35	19	588	118	1,165		160	160	240
Pennsylvania			26	C			28							
Rhode Island	28,053	2	2,566	C	25	75	73		6,212		488			
South Carolina	11,040	1		C	29	71	31					16	80	34
South Dakota														
Tennessee	2,054	<1					1	1	1	2				
Texas	106,369	9	425	NC	21	79	27	107	474	474	12	2	4	6
Utah														
Vermont			<1						10	20	1	10	40	40
Virginia	69,561	6	898	C	14	86	199	250	2,759	2,759	5	2,112	4,174	7,013
Washington	39,286	3	350	C	39	61	60							
West Virginia												5	5	5
Wisconsin														
Wyoming														
Other	6	<1												
Total	1,187,511	100	14,266				1,959							

SHELLFISH MATRIX NOTES

Column 1 — Commercial Landings, 1987 (thousand lbs.)
Blank= Landings, if any, included in "Other".
Source: "U.S. Commercial Landings, by States, 1986 and 1987", *Fisheries of the United States, 1987*, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, and interviews with their staff.

Column 2 — Commercial Landings, 1987, as Percent of U.S. Total
Source: Derived from Column 1.

Column 3 — State Expenditures for Programs, 1985-86, ($thousands)
Blank= No expenditures reported.
Includes such expenditures as inspection, monitoring, patrol and relay, survey of harvest waters, etc. A few agencies in a few states reported expenditures for a different time period. Not all agencies in all states reported; therefore, expenditures may be underreported.
Source: FDA, Division of Federal-State Relations, unpublished spreadsheet from "State Resource Data Survey" and/or individual data sheets submitted by states from which spreadsheet was compiled. This data is considered imperfect but is the best available.

Column 4 — FDA Evaluation of Conformity of State Shellfish Sanitation Program with the Requirements of the National Shellfish Sanitation Program (NSSP), as of March 2, 1988
C= In conformance, NC= Not in conformance
Source: *Report to the Interstate Shellfish Sanitation Conference: Status of State Shellfish Sanitation Programs 1987*, FDA Shellfish Sanitation Branch.

Column 5 — Percent of Productive Shellfish Waters with Harvest Limited, 1985
Productive waters are those areas which did or could produce shellfish (either naturally or aquaculturally) in quantities sufficient to justify commercial harvesting. Harvest limited includes 1) conditionally approved areas: those approved for only part of the year due to pollution or failure of authorities to establish approved standards during that period, 2) restricted areas: those where shellfish is contaminated, and 3) prohibited areas: those which are closed due to hazardous levels of contamination or areas that have not been surveyed at all.
Source: Derived from National Oceanic and Atmospheric Administration and the U.S. Department of Health and Human Services, *1985 National Shellfish Register of Classified Estuarine Waters*, 1985.

Column 6 — Percent of Productive Shellfish Waters Approved for Harvest, 1985
Approved for harvest are those areas surveyed and found free of hazardous concentrations of harmful organisms and/or pollution.
Source: See Column 5.

Column 7 — Number of Interstate Certified Shellfish Shippers, 10/1/88
Source: *Interstate Certified Shellfish Shippers List, October 1, 1988*, Food and Drug Administration, Public Health Service, U.S. Department of Health and Human Services.

Inspection and Laboratory Data (Columns 8-14)
Inspection Data
- **Column 8 — Inventory** (number of establishments such as processors, ships, etc.)
- **Column 9 — Number of Inspections**
- **Column 10 — Inspection Person-Hours**
- **Column 11 — Number of Actions**

Laboratory Data
- **Column 12 — Number of Official Samples Analyzed**
- **Column 13 — Number of Determinations** (results of a test such as for a single residue)
- **Column 14 — Analytical Person-Hours**

Blank= No data reported.
A few agencies in a few states reported data for a different time period. Not all agencies in all states reported; therefore, data may be underreported.
Source for Columns 8-14: See Column 3.

FOOD PROCESSING MATRIX

	1	2	3	4	5
Alabama				X	X
Alaska			X	X	X
Arizona				X	X
Arkansas	1	1R		X	X
California	3	3C		X	X
Colorado	2			X	X
Connecticut	1			X	X
Delaware					
Florida	1		X	X	X
Georgia	1	1C			
Hawaii			X	X	X
Idaho					
Illinois	3	1C,2CR		X	X
Indiana	1			X	X
Iowa			X	X	X
Kansas				X	X
Kentucky				X	X
Louisiana				X	X
Maine					
Maryland	3			X	X
Massachusetts	1	1CR		X	X
Michigan				X	X
Minnesota	1			X	X
Mississippi	1	1CR			
Missouri				X	X
Montana				X	X
Nebraska	2			X	X
Nevada				X	X
New Hampshire				X	X
New Jersey	6	3CR,1R		X	X
New Mexico					
New York				X	X
North Carolina	1	1R		X	X
North Dakota				X	X
Ohio	2	1C,1CR		X	X
Oklahoma			X	*	*
Oregon				X	X
Pennsylvania	1			*	*
Rhode Island				X	X
South Carolina	2	1CR		X	X
South Dakota	1			X	
Tennessee				X	X
Texas	6	1CR		X	X
Utah	1	1CR		X	X
Vermont				X	X
Virginia	1	1C		X	X
Washington			X	X	X
West Virginia				X	X
Wisconsin				X	X
Wyoming				X	X
Total	42	7C,11CR,3R			

FOOD PROCESSING MATRIX NOTES

Food Irradiation (Columns 1-3)

Column 1 — Number of Irradiators Capable of Irradiating Food on a Commercial Scale
These are capable of irradiating food on a commercial basis. However, only a few actually are doing so. In addition, a few are irradiating food on a research basis. Source: "List of the 40 Irradiation Facilities in the U.S. (not including those that can be found at hospitals or universities)", January 1987, Food Irradiation Response, Santa Cruz, CA and correspondence with compilers of the list.

Column 2 — Food Irradiation Operations (as of January 1987)
These operations irradiate spices on a commercial (C) or research (R) basis, or both (CR). Source: See Column 1.

Column 3 — Planned U.S. Department of Energy Food Irradiation Facility
Source: U.S. Department of Energy, Advanced Radiation Technology Program, July 1988.

Food Additives (Columns 4- 5)

Column 4 — Food Additive Amendment
X= State has adopted a food additive amendment to its basic food law.

Column 5 — Color Additive Amendment
X= State has adopted a color additive amendment to its basic food law.

* Oklahoma: Food additives not in conformance with Federal requirements are deemed to be adulterants under the Oklahoma Food Law; Pennsylvania: Food additives are dealt with under Pennsylvania's General Food Law of 1909.
Source for Columns 4-5: FDA, State Services Branch, *State Law Data 1989.*

INSPECTION AND MONITORING MATRIX

	1	2	3	4	5	6			7			8		
Alabama	B		X	350	P A	62	27	1	137	0	3	296	1	1
Alaska	A		X	276	P MD	12	2	0	0	0	0	1	0	0
Arizona	A	X	X	241	P MDA	345	217	33	104	0	0	2	0	0
Arkansas	A		X		PC A	107	45	2	473	0	39	582	1	2
California	A	X	X	4,483	PCMDA	2100	822	50	1007	0	9	343	0	3
Colorado	A	X	X	52	P MD	68	24	4	740	0	4	41	0	1
Connecticut	A	*	X	362	PCM A	18	6	1	216	0	1	0	0	0
Delaware	A	X	X	52	P A	24	10	0	2	0	0	101	1	0
Florida	A	X	X	668	P A	333	86	9	182	0	3	58	0	0
Georgia	A		X	128	P A	151	38	2	157	0	0	495	4	2
Hawaii	A	X	X	612	P A	42	0	0	20	0	1	2	0	0
Idaho	A		X	413	P MDA	50	26	0	151	0	0	0	0	0
Illinois	A	X	X	52	P M	102	65	1	1113	4	14	0	0	0
Indiana	A	X	X	75	PC*M*	34	11	0	585	6	15	325	0	0
Iowa	B	X	X	80	PC DA	86	37	0	1724	8	18	95	0	0
Kansas	A		X	66	P MD	46	12	0	1019	0	2	0	0	0
Kentucky	A	X	X	2	P DA	12	2	0	300	2	6	35	0	0
Louisiana	A	X	X			91	18	3	119	0	0	14	0	0
Maine	A		X		P M	23	9	0	35	0	1	12	0	0
Maryland	A	X	X		P M	70	24	1	75	0	2	96	0	0
Massachusetts	A		X	267	PC	69	49	1	63	0	2	0	0	0
Michigan	A		X	899	PCM A	102	35	5	588	2	6	31	1	0
Minnesota	A		X	301	PCMD	152	60	0	714	4	5	333	0	1
Mississippi	B		X		PCMDA	43	22	0	175	1	2	172	0	0
Missouri	A		X	29	PCMDA	120	47	0	332	1	7	135	0	0
Montana	A	X	X	143	PC A	0	0	0	11	0	0	0	0	0
Nebraska	A		X	44	P D	22	10	0	1276	1	7	12	0	0
Nevada	A		X	1		4	2	0	1	0	0	0	0	0
New Hampshire	A		X			11	5	0						
New Jersey	A		X	869	M A	79	25	0	385	0	3	110	0	0
New Mexico	A		X			25	11	0	61	0	0	0	0	0
New York	A	X	X	425	PCM A	188	65	9	637	0	5	74	0	0
North Carolina	A	X	X	177	PC DA	76	29	0	175	0	4	598	2	6
North Dakota	A		X	48	PCMD	26	5	0	21	0	0	0	0	0
Ohio	A		X	37	PC	10	44	0	440	3	7	144	0	1
Oklahoma	A		X	119	P MDA	13	8	0	74	0	1	58	1	1
Oregon	A		X		PCMDA	95	12	1	42	0	1	14	0	0
Pennsylvania	B		X			92	29	0	639	0	6	128	2	0
Rhode Island	A	X	X			12	3	0						
South Carolina	A	X	X	97	PCMDA	36	16	0	210	0	4	73	0	0
South Dakota	A				PC	11	8	1	554	1	6	171	0	3
Tennessee	A		X	46	P A	29	9	0	326	1	4	53	0	1
Texas	A	X	X	8	PCM A	283	148	9	2435	2	19	178	1	3
Utah	A	X	X		P M	5	1	0	77	0	0	2	0	0
Vermont	A		X		P	16	0	0	88	0	2	0	0	0
Virginia	A		X	557	P M A	46	20	1	495	1	9	324	1	1
Washington	A	X	X	443	PCM A	81	30	0	368	0	2	33	0	1
West Virginia	B		X	49	M*	5	3	1	9	0	0	15	0	0
Wisconsin	A	X	X		PCM	169	100	0	936	1	6	162	0	2
Wyoming	A		X	43		0	0	0						
Total				12,514										

INSPECTION AND MONITORING MATRIX NOTES

BASIC LAWS (Columns 1-3)
Column 1 — Basic Food Law
A= Federal 1938 Act, B= Federal 1906 Act

Column 2 — Automatic Adoption of FDA Provisions
*CT: By reference to Federal Register

Column 3 — Embargo Authority

Source for Columns 1-3: FDA, State Services Branch, *State Law Data 1989.*

STATE RESIDUE MONITORING (Columns 4-5)
Column 4 — Expenditures for Monitoring of Pesticide and Industrial Chemical Residues, 1985-86 ($thousands)

Column 5 — Contaminants for which States Conducted Testing, 1985-86
P= Pesticides, C= Industrial Chemicals, M= Heavy Metals, D= Drugs, A= Aflatoxin.
*Information received too late for inclusion in The State of the States 1989.

Blank= No expenditures or testing reported.
Not all agencies in all states reported; therefore, expenditures or testing may be underreported. A few agencies in a few states reported expenditures or testing for another time period.
Source for Columns 4-5: FDA, Division of Federal-State Relations, unpublished spreadsheet from "State Resource Data Survey" and/or individual data sheets submitted by states from which spreadsheet was compiled. This data is considered imperfect but is the best available.

FEDERAL RESIDUE MONITORING (Columns 6-8)
Column 6 — Results of FDA Pesticide Monitoring, Fiscal Year 1987
Number of samples taken in the state/ Number of samples found to contain residues of one or more pesticides/ Number of samples found to contain residues in violation of EPA tolerances.
Domestic surveillance samples not including meat and poultry. It would not be statistically valid to compute state food contamination rates from these data.
Source: Tabulated from FDA pesticide monitoring data for Fiscal Year 1987.

Column 7 — Results of USDA National Residue Program, Meat, 1987
Blank= No reports.
No reports for some quarters for AK, MT, NV.
Number of samples taken in the state/ Number of samples with residue levels from 80-100 percent of EPA tolerances/ Number of samples found to contain residues in violation of EPA tolerances. It would not be statistically valid to compute state meat contamination rates from these data.
Source: Tabulated from USDA State Residue Monitoring Quarterly Reports for 1987.

Column 8 — Results of USDA National Residue Program, Poultry, 1987
Blank= No reports.
No reports for some quarters for AK, MT, NV.
Number of samples taken in the state/ Number of samples with residue levels from 80-100 percent of EPA tolerances/ Number of samples found to contain residues in violation of EPA tolerances. It would not be statistically valid to compute state poultry contamination rates from these data.
Source: See Column 7.

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WITH SPECIAL THANKS TO:

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1987	1988	1989
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Focus Papers	**Focus Papers**	**Focus Papers**
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- Groundwater Protection	- Indoor Pollution	- Solid Waste Recycling
- Hazardous Waste Management	- Land Use Planning	- Drinking Water
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THE STATE OF THE STATES
1989

GROWTH AND THE ENVIRONMENT

5

FOCUS PAPER

RENEW AMERICA

Growth and the Environment Focus Paper

by:

Richard Magder
Renew America
February 1989

Renew America is a non-profit, tax-exempt educational organization working toward a sustainable future by promoting a safe and healthy environment. For further information on Renew America, or to obtain additional copies of this report, write to: Renew America, 1001 Connecticut Ave., N.W., Suite 719, Washington, D.C. 20036, or call (202) 466-6880. See page 24 for further ordering information. © Renew America, February 1989.

Introduction

The Growth and the Environment Focus Paper is a supplement to the *1989 State of the States* report. Like the main report, it includes a map, matrices, and a discussion of key issues. The focus paper also contains new information not found in the main report, including additional matrices on state population statistics, farmland protection programs, and energy consumption data. This focus paper is not intended to be a comprehensive assessment of growth management activity in each state, nor of environmental conditions resulting from growth impacts. Rather, its purpose is to provide the best information available about key state laws and programs.

Growth management has emerged as a high-profile issue in the 1980s. Concern for the quality of life—including clean air, clean water, open space, and uncongested highways—is at the top of the agendas of many local communities and states. While attention is often directed to the problem of reducing population growth, it is important to understand how the impact of population growth and economic development on the environment is geometrically increased by inefficient and wasteful use of resources, as well as institutional barriers to change. This report focuses on innovative state and local policies that promote resource efficiency and limit stresses on the environment due to growth and development. For additional sources on growth management issues, see the contact list on page 23 of this report.

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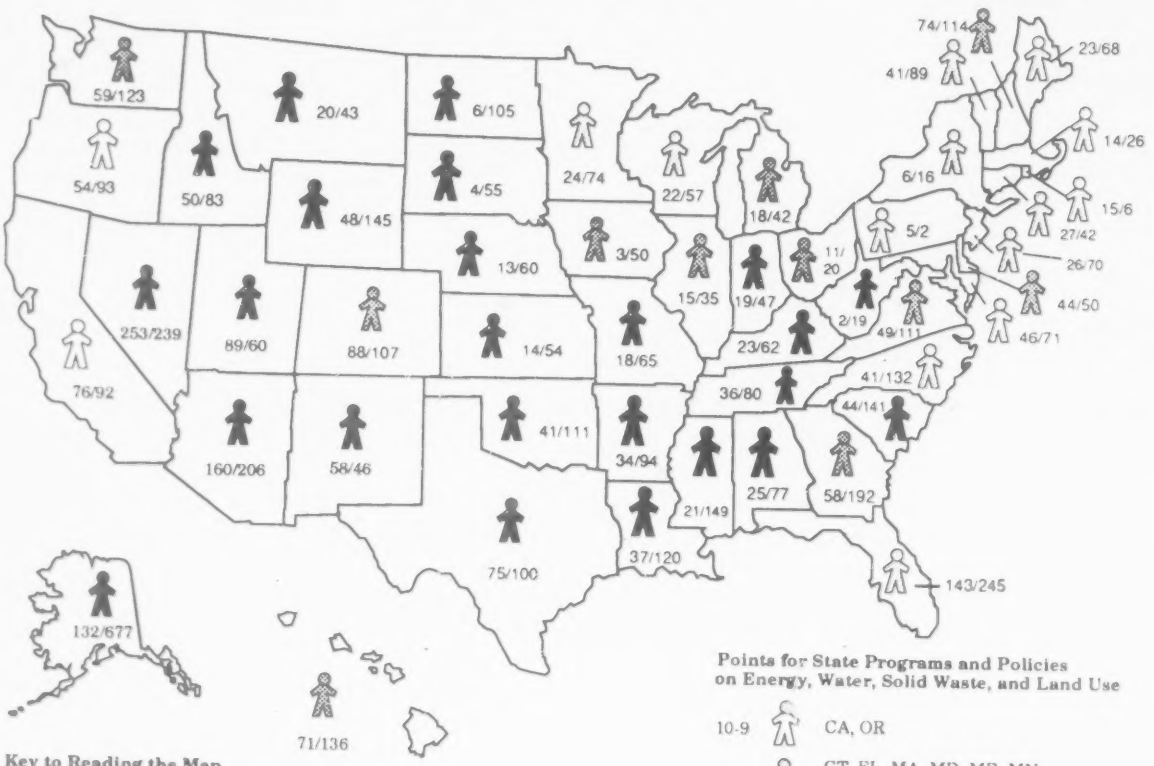
CHANGE IN POPULATION AND ENERGY CONSUMPTION



Key to Reading the Map

Example: Oregon - Best Overall

10 Points for Programs and Policies

54/93

54 percent increase in population 1960-1987

93 percent increase in energy consumption 1960-1986

In addition to energy consumption shown on the map rates of water consumption and solid waste production have also far outstripped the rate of population growth over the last 25 years.

Points for State Programs and Policies on Energy, Water, Solid Waste, and Land Use

10-9	CA, OR
8-7	CT, FL, MA, MD, ME, MN, NC, NJ, NY, PA, RI, VT, WI
6-5	CO, DE, GA, HI, IA, IL, MI, NH, OH, VA, WA
4-3	AK, AZ, ID, IN, KS, KY, MO, ND, NE, NM, NV, OK, SC, TX, UT,
2-1	AL, AR, LA, MS, MT, SD, TN, WV, WY

Source: Renew America, 1989

GROWTH AND THE ENVIRONMENT

To many people, the American Dream appears to be at odds with a healthy environment. This perception has led to arguments that environmental protection costs jobs and prevents communities from sharing in economic growth. But the question is not whether communities will grow — but how they will grow, and at what cost.

Along California's rugged and scenic coast lies the city of Morro Bay, home to retirees, a few resort motels, and a modest commercial fishing industry. Although a quiet place, the city is in the path of a real estate boom expanding rapidly out of the Los Angeles area four hours to the south. Economic growth and population pressures are stressing the city's natural resources, which include a water supply that dries up every four years. With encouragement from the state's coastal commission, Morro Bay acted to protect its fragile coastline by imposing a limit of 70 new homes per year, and requiring builders to save twice the water their new buildings will use by retrofitting the community with water-conserving devices.1

Morro Bay's creative response to its growth dilemma is the kind of solution state and local governments are beginning to examine to protect water supplies, reduce air pollution and energy use, and maintain valuable farmland and other critical areas in the face of growth pressures.

In the past, the impacts of growth on the environment were seen largely as a function of population expansion. Energy use, water consumption, and solid waste generation seemed to have per capita equations fixed to an idea that individuals consume a set amount of resources. However, the impact of population on the environment is more complex. While the stress of population is a fundamental part of the problem, use of inefficient technologies and institutionalization of waste can geometrically increase human impact. Utilization of water widgets in showers, building code standards to increase energy efficiency, recycling programs, encouragement of mass transportation and regular inspection of car exhaust systems, statewide land-use planning, and a host of other policies can radically reduce both consumption and pollution in the U.S.

The amount of waste and inefficiency built into our resource use is clearly evident. Since 1960, the U.S. population has increased by 34 percent. At the same time the volume of solid waste has grown by 80 percent. Water consumption has increased by 51 percent. And energy use has increased by 69 percent.2

Addressing institutionalized waste in our resource use is a first step in managing the pressures of growth and in moving toward the ideal of sustainable systems. In bits and pieces state and local governments have begun to develop policies that will reduce the impact of growth on the environment. Some of the most impressive progress has been in energy use.

Energy Efficiency

At one time electricity consumption was considered to have an "iron link" to economic growth. But today, partly because of conservation and increased energy efficiency, we use 25 percent less energy for every dollar of Gross National Product than we did in 1974.3

Policies to reduce fossil fuel consumption were introduced in the wake of the energy crisis of the 1970s. The federal government encouraged states to develop energy conservation programs. Substantial savings have occurred in these programs, especially in the area of building codes that require energy-efficient design for insulation, lighting and water heating. Although 31 states currently have some form of these building codes statewide, only eight are considered to have relatively comprehensive standards.4

Another potentially successful energy strategy is least-cost planning. It requires utilities to provide energy at the least possible cost and to consider all alternatives in meeting this objective. As a result of least-cost planning provisions, California Pacific Gas and Electric has been forced to make improvements in energy effiiciency through conservation and renewable energy, rather than spend $20 billion on new coal and nuclear-powered plants it had proposed. In spite of its efficacy, only ten states have adopted comprehensive policies to integrate least-cost planning in investment decisions of utilities.5

There have also been ongoing efforts to develop energy sources with low environmental impact, but support for such programs is in decline. At one time 24 states provided a tax credit for investments in renewable energy, such as solar, wind, hydro and geothermal power. Currently, only 15 states provide such incentives, and many of these remaining tax credits may expire in the next few years. This waning interest can be traced to lower oil prices in the 1980s, the Reagan Administration's lack of support for renewable energy, and to a belief in the need to bring about a resurgence of the nuclear industry in the 1990s.6

As the savings since 1974 indicate, energy efficiency holds the greatest immediate promise. The best available lights, motors,

GROWTH AND THE ENVIRONMENT
MATRIX I

	1	2	3	4	5	6	7	8	9	10
Alabama	4,083	25%	1,454	77%	19/13/44/24	1	527	968 (24%)	54/43/3	None
Alaska	525	132%	474	677%	9/16/43/32	1	407	300 (58%)	49/51/0	Local/S**
Arizona	3,386	160%	839	206%	21/21/23/36	1	285	2,744 (86%)	42/52/6	Local/S*
Arkansas	2,388	34%	751	94%	21/13/39/28	2	462	0(0%)	45/42/12	None
California	27,663	76%	6,471	92%	18/17/27/39	B,T,3	160	25,398 (96%)	5/94/1	Local/S**
Colorado	3,296	88%	868	107%	22/25/21/32	1	279	2,714 (84%)	29/65/6	Local/S*
Connecticut	3,211	27%	704	42%	30/23/19/28	3	147	3,174 (100%)	60/35/5	State/W
Delaware	644	44%	214	50%	19/13/41/28	T,1	385	413 (66%)	52/43/5	Local/W
Florida	12,023	143%	2,666	245%	26/21/15/37	B,3	245	5,789 (51%)	12/84/4	None
Georgia	6,222	58%	1,828	192%	21/15/30/34	1	345	2,204 (37%)	35/65/0	Local/W**
Hawaii	1,083	71%	231	136%	9/10/25/56	T,1	228	0(0%)	39/61/<1	None
Idaho	998	50%	329	83%	22/19/34/25	T,2	207	309 (31%)	75/25/0	Local/W*
Illinois	11,582	15%	3,357	35%	25/18/35/21	3	263	8,999 (78%)	67/28/4	Local/W
Indiana	5,531	19%	2,221	47%	19/11/46/25	2	579	2,470 (45%)	64/35/1	Local/S
Iowa	2,834	3%	894	50%	24/15/36/24	3	366	1,180 (41%)	71/29/0	None
Kansas	2,476	14%	972	54%	18/16/38/28	1	429	867 (35%)	66/3/31	None
Kentucky	3,727	23%	1,301	62%	20/13/41/26	1	565	1,532 (41%)	39/55/6	Local/W*
Louisiana	4,461	37%	3,229	120%	9/8/63/20	1	695	2,647 (59%)	40/24/36	Local/W*
Maine	1,187	23%	329	68%	24/14/32/31	3	256	1,013 (87%)	53/35/12	None
Maryland	4,535	46%	1,140	71%	25/14/32/28	2	230	3,546 (81%)	44/55/1	Local/W
Massachusetts	5,855	14%	1,279	26%	29/22/18/30	B,T,2	188	5,822 (100%)	52/41/7	State/W*
Michigan	9,200	18%	2,586	42%	26/15/34/25	T,1	308	8,169 (90%)	45/55/0	Local/W
Minnesota	4,246	24%	1,219	74%	25/15/33/28	B,2	235	2,649 (63%)	54/41/5	New/Na
Mississippi	2,625	21%	883	149%	18/13/38/31	1	424	0(0%)	59/41/0	None
Missouri	5,103	18%	1,431	65%	26/18/24/32	2	329	2,310 (46%)	86/14/<1	Local/W**
Montana	809	20%	315	43%	18/14/42/26	2	520	429 (52%)	64/36/0	None
Nebraska	1,594	13%	489	60%	25/22/24/29		300	735 (46%)	67/33/0	None
Nevada	1,007	253%	295	239%	21/15/24/39	3	373	914 (98%)	48/51/1	Local/W**
New Hampshire	1,057	74%	216	114%	30/15/23/32	2	193	898 (90%)	62/30/8	Local/Na
New Jersey	7,672	26%	2,182	70%	22/19/23/36	T,2	202	7,562 (100%)	35/54/11	State/S
New Mexico	1,500	58%	468	46%	15/18/31/37	T,2	509	492 (34%)	50/50/0	Local/Na
New York	17,825	6%	3,397	16%	28/28/19/25	B,2	137	13,008 (73%)	49/43/8	Local/W*
North Carolina	6,413	41%	1,750	132%	23/16/32/30	B,T,2	295	441 (7%)	52/46/2	Local/W**
North Dakota	672	6%	306	105%	18/13/48/22	T,1	968	0(0%)	57/25/17	None
Ohio	10,784	11%	3,553	20%	23/15/40/22	2	382	8,570 (80%)	39/32/29	Local/Na
Oklahoma	3,272	41%	1,208	111%	19/15/39/27	T,1	429	552 (17%)	74/26/<1	Local/W**
Oregon	2,724	54%	801	93%	23/18/27/32	T,3	176	1,814 (68%)	29/53/18	Local/S**
Pennsylvania	11,936	5%	3,272	2%	24/14/37/24	3	357	10,513 (89%)	51/49/0	Local/S
Rhode Island	986	15%	195	6%	30/22/19/29	T,1	159	968 (100%)	68/32/0	State/W
South Carolina	3,425	44%	1,081	141%	20/13/41/25	T,2	330	569 (17%)	40/60/0	None
South Dakota	709	4%	198	55%	27/15/27/30	B,1	300	76 (11%)	75/25/0	None
Tennessee	4,855	36%	1,657	80%	22/17/34/28		397	2,064 (43%)	46/54/0	Local/S
Texas	16,789	75%	8,780	100%	12/11/54/23	3	510	7,652 (47%)	24/24/52	Local/W**
Utah	1,680	89%	478	60%	22/14/34/30	T,1	412	1,291 (78%)	69/28/3	Local/W*
Vermont	548	41%	115	89%	27/16/24/33	3	152	176 (33%)	68/32/0	None
Virginia	5,904	49%	1,671	111%	23/20/25/31	2	224	1,438 (25%)	40/60/0	Local/W
Washington	4,538	59%	1,655	123%	21/16/33/30	3	209	2,713 (62%)	44/56/0	Local/S
West Virginia	1,897	2%	720	19%	17/11/53/19	1	1179	506 (26%)	54/46/0	None
Wisconsin	4,807	22%	1,283	57%	27/16/33/25	B,3	287	2,873 (60%)	45/35/20	Local/W
Wyoming	490	48%	346	145%	11/10/61/19	1	996	45 (9%)	46/54/0	None

appliances, and other devices have the potential to reduce our national energy bill from $400 billion to $270 billion, or less, and provide a cornerstone for reducing pollution.

In examining an eight state area from Michigan to Virginia, one study shows that by using aggressive end-use efficiency measures, no new power plants will be needed until 2005, and plants contributing the pollution most expensive to control can be shut down.[7] And at the local level, a number of cities and towns are looking to substantially lower their energy use. The city of Austin, Texas, which has a non-profit public power system, plans to reduce municipal power demand by 20 percent by 1997.

These efficiency measures have broader effects, too. Reducing the burning of fossil fuels will cut down on carbon dioxide emissions, a contributor to the "greenhouse effect," or global warming. If global temperatures continue to rise, changes in weather could significantly disrupt agriculture, and melt polar ice-caps raising the levels of the oceans and flooding coastal cities.

Air Quality

States play an important role in controlling air pollution. While the federal Environmental Protection Agency sets air pollution standards, states are responsible for issuing permits, monitoring emissions and enforcing violations for stationary air pollution sources. They also must develop plans for reducing air pollution to meet EPA's clean air standards.

Since the mid-1970s significant progress has been made in reducing air pollution nationwide. Average ozone levels decreased by 21 percent, from 1977 to 1986, and sulfur dioxide levels declined by 37 percent over the same time period.[8] Among the federal actions having the greatest impact on air quality was the ban on lead in gasoline. From 1977 to 1986, average lead concentrations decreased by 87 percent. Additionally, automobile emission technology improved fuel efficiency from 13 to 18 miles per gallon since 1977.

Yet, air quality gains could be greater. In California, 96 percent of the residents live in counties that fail to meet clean air standards for one of EPA's four criteria pollutants. In the East, entire states violate these standards, including Massachusetts, Rhode Island, Connecticut and New Jersey.[9]

Pollution from mobile sources could be cut further by ensuring that vehicles comply with federal emission standards. Currently just three states have comprehensive programs with standards that include an under-the-hood inspection, critical for accurately testing car exhaust. Sixteen states have yet to adopt any inspection and maintenance program, in spite of the threat of EPA sanctions.

Mass transportation programs can also help, but unfortunately a 1984 Department of Transportation study shows that the percent of workers commuting by public transportation fell from 7.3 to 5.5 percent from 1969 to 1983.

GROWTH & THE ENVIRONMENT MAIN MATRIX (I) KEY

1. State Population: 1987, in thousands.

2. Population Change: 1960-1987, in percent.

3. Energy Consumption: 1986, in trillions of BTU's.

4. Change in Energy Consumption: 1960-1986, in percent.

5. Energy Consumption by End-Use: Percent of total energy consumption used for Residential/Commercial/Industrial/Transportation in 1986.

6. State Energy Conservation Programs: B= substantial building standards for energy efficiency; T= tax credit for renewable energy investments; 1,2, or 3= least-cost planning score, 3=comprehensive, 2=making progress, 1=no program.

7. Carbon Emissions: Metric tons of carbon released to atmosphere per one million dollars of Gross State Product.

8. Air Pollution: Residents living in counties not meeting EPA's clean air standards, in thousands of people, June 1988; and percent this represents of total state population.

9. State Air Pollution Control Program Budgets: Percent federally funded/ state funded/percent from emissions and permit fees charged to polluters, 1985 and 1986.

10. State Car Emissions Inspection and Maintenance Programs: State= program is administered by state agency; Local= state program run by local agencies; None= no state program; New= program is new and not evaluated/ W= inspection standards are weak; S= inspection standards are strong; *= includes a limited under-the-hood inspection; **= includes a complete under-the-hood inspection; Na= no information.

For sources, see page 12.

GROWTH AND THE ENVIRONMENT
MATRIX II

	11	12	13	14	15	16	17	18	19	20	21	22
Alabama	541	20/14/45/21	1,218 (30%)	0 (100%)	S*	100*/98	5 - 10	2%	NC /---	111	7,270	
Alaska	27	0/48/41/11	1,715 (1%)	120,200 (2%)	E	100/34	>10	<1%	N /P	1940	nd	
Arizona	4880	89/7/3/1	786 (8%)	4,807 (31%)	E	13/95	>10	1%	NC /---	179	1,091	
Arkansas	3485	97/2/1/1	5,490 (100%)	No Data	S*	100/94	>10	1%	NC /---	173	11,625	
California	22029	93/5/2/0	3,494 (36%)	668,390 (92%)	S	43/100	>10	11%	Y /B,P	79	5,891	C,P,D
Colorado	7730	97/2/1/0	No Data	No Data	S	58/97	5 - 10	nd	N /---	194	1,686	G
Conn.	106	5/70/12/14	269 (10%)	1,865 (45%)	S*	100*/99	< 5	2%	Y /M,B,P	30	355	W,P
Delaware	39	74/15/10/3	206 (89%)	No Data	S	100/85	> 10	7%	N /B,P	109	431	G,W
Florida	2787	77/14/9/1	2,118 (71%)	304,258 (87%)	E	71/99	5 - 10	1%	Y /M,B,P	197	1,105	G,W
Georgia	838	60/18/9/14	850 (85%)	54,305 (100%)	S*	81/100	> 10	1%	NC/--	138	7,728	
Hawaii	223	51/46/3/0	No Data	No Data	S*	100/97	5 - 10	3%	N /---	21*	297	G
Idaho	11720	99/<1/<1/0	1,243 (100%)	0 (100%)	E	100/91	> 10	<1%	NC/---	108	3,413	
Illinois	686	17/23/41/18	1,521 (24%)	22,539 (10%)	S	78/88	5 - 10	2%	Y /P	74	21,253	D
Indiana	454	19/14/50/17	No Data	2,617 (94%)	S	71/85	5 - 10	5%	NC /---	95	13,511	
Iowa	473	51/32/7/11	4,234 (24%)	19,951 (91%)	S*	89/90	> 10	3%	Y /B,P	60	18,683	
Kansas	4997	96/2/1/1	997 (22%)	53,745 (94%)	S	29/81	> 10	1%	NC /---	110	25,602	
Kentucky	260	22/23/7/48	2,520 (14%)	36,125 (96%)	S*	81/96	< 5	nd	N /---	131	6,051	D
Louisiana	2236	77/6/8/9	1,276 (18%)	60,831 (91%)	E	83/85	> 10	1%	N /---	70	12,975	
Maine	203	13/46/41/0	950 (100%)	39,782 (100%)	E	93/90	5 - 10	5%	N /B,P	5	1,274	G,W,C*
Maryland	423	11/12/9/69	595 (80%)	7,820 (100%)	S*	80/94	5 - 10	8%	N /M	188	1,249	C,P,D
Mass.	316	5/60/14/21	891 (16%)	No Data	E	89/64	< 5	5%	Y /B,P	41	382	W,P
Michigan	611	41/20/20/18	727 (100%)	No Data	S*	76/47	5 - 10	7%	Y /B,P	51	7,799	W
Minn.	787	35/23/24/18	No Data	No Data	S*	83/91	5 - 10	4%	Y /P	84	20,838	W,D
Mississippi	753	76/6/6/13	1027 (100%)	19,800 (99%)	S*	100*/96	> 10	nd	N /---	154	10,341	
Missouri	504	52/24/7/18	10,063 (100%)	No Data	S*	79/93	5 - 10	nd	Y /---	97	15,000	
Montana	6170	99/1/0/0	7,412 (95%)	33,284 (88%)	S	100/100	5 - 10	<1%	N /---	119	1,015	
Nebraska	7520	98/1/0/0	2,064 (20%)	3,150 (53%)	S*	100*/91	> 10	3%	NC /---	92	12,243	
Nevada	2622	94/4/1/1	No Data	No Data	S	40/67	> 10	0%	NC /---	231	314	
New Hamp.	76	1/25/67/7	340 (9%)	No Data	E	91/68	5 - 10	5%	NC /---	16	144	W,P
N. Jersey	279	44/40/16/0	550 (12%)	5,298 (100%)	S*	100/97	< 5	10%	Y /M,P	19	864	G,W,P,D
N. Mexico	1530	86/9/2/3	350 (100%)	458 (100%)	E	100/73	> 10	3%	Y /---	96	615	
New York	1400	No Data	770 (5%)	146,322 (99%)	S	95/90	5 - 10	1%	Y /M,B,P	52	5,138	W,P,D
N. Carolina	439	36/36/19/8	12,328 (100%)	9,615 (100%)	S*	100/100	> 10	<1%	NC /---	139	5,680	C,P,D
N. Dakota	209	74/10/6/11	No Data	No Data	S	67/100	> 10	nd	N /---	144	13,913	W
Ohio	396	14/28/42/16	2,568 (15%)	No Data	S*	83/91	< 5	2%	N /---	48	12,248	D
Oklahoma	579	77/11/5/8	No Data	No Data	E	95/92	5 - 10	nd	NC /---	137	15,049	
Oregon	3372	96/3/1/0	2,106 (13%)	77,900 (38%)	S*	95/100	> 10	20%	NC/M,B,P	92	1,936	G,W
Penn.	589	12/20/35/33	2,760 (12%)	No Data	S	100/93	< 5	1%	Y /M,P	49	4,285	W,P,D
Rhode Isl.	23	22/65/13/0	72 (100%)	496 (100%)	S*	77/91	5 - 10	3%	Y /M,P	48	79	G,W,P
S. Carolina	340	13/17/54/16	315 (25%)	4,050 (89%)	S*	84/97	> 10	nd	N /---	184	3,429	
S. Dakota	481	93/5/2/0	2,107 (40%)	85,189 (41%)	E	50/97	> 10	0%	NC /---	71	6,426	
Tennessee	275	12/19/68/0	1,950 (30%)	107,720 (100%)	S*	87/92	> 10	nd	NC /---	160	6,318	
Texas	9397	82/9/7/2	960 (20%)	No Data	E	90/93	> 10	6%	N /---	90	37,621	
Utah	2435	92/5/11/1	No Data	No Data	S*	69/100	> 10	nd	N /---	121	787	
Vermont	26	8/38/50/4	280 (24%)	13,443 (100%)	S*	100*/20	5 - 10	12%	Y /B,P	53	336	G,W,P
Virginia	274	16/37/27/20	3,705 (17%)	11,665 (100%)	S	96/93	< 5	1%	Y /---	143	5,032	C,D
Wash.	4739	95/2/2/0	No Data	No Data	S*	50/84	> 10	5-10%	Y /M	100	2,308	P
W. Virginia	877	3/4/18/75	8,032 (80%)	1,777 (100%)	S*	86/85	< 5	<1%	N /---	45	539	
Wisconsin	321	49/16/18/17	No Data	767,090 (100%)	S*	83/93	> 10	74%*	Y /M,P	46	9,414	W
Wyoming	4280	98/1/1/1	2,359 (100%)	51,822 (70%)	S	50/100	> 10	3%	N /---	153	349	

Water Conservation

Water consumption issues are similar to energy and air pollution concerns in many ways. Solutions range from simple technological changes, like installing water-saving showerheads, to statewide water-use restrictions. Water depletion affects every region of the country. Major water level declines have occurred in every eastern coastal state from New Jersey to Georgia. But the problems are most severe in the arid West. The aquifers of the High Plains covering Texas, Kansas and New Mexico have been drained by more than 50 percent, and five of the fastest growing states in the nation, Colorado, Arizona, Utah, California and Nevada, rely on the Colorado River as a surface water source.[10]

Western water problems are due largely to intensive irrigation, which is often subsidized by federal water projects that provide water far below cost. One state that has addressed the issue head on is Arizona, which passed a comprehensive groundwater protection law prohibiting the development of new irrigation and restricting farming withdrawals to levels determined by a state formula. The state's goal is to have a sustainable groundwater supply by the year 2025.[11]

Water conservation is not strictly an issue concerning western agriculture. Inexpensive and unlimited water supplies across the nation may come to an end soon, as federal funding is phased out for wastewater treatment plants and new federal requirements under the Safe Drinking Water Act come into effect.

One of the leaders in water conservation is Massachusetts. By March 1989, new and retrofitted toilets in the state must flush less than 1.6 gallons of water, half the flow most toilets use today. Other states with aggressive water conservation programs include California, Minnesota and Maryland, however most action is occurring at the local level. Los Angeles, for example, recently sent water saving showerheads and toilet bags to all homes, requiring residents to certify installation or face costly surcharges on their water bills. In Denver, a conservation group has shown that an expensive and ecologically damaging dam could be avoided if the city installs water-saving devices in all homes and implements water-conserving landscape techniques.[12]

Water Quality

In addition to conserving water, much needs to be done to improve water quality. Although some lakes and streams have been cleaned up since the Clean Water Act passed in 1972, most states still have a thousand or more river miles and a thousand or more lake acres not meeting EPA's designated use standards. In some states, the degraded lake acres and river miles measure in the tens and hundreds of thousands, such as in Wisconsin, with 767,090 lake acres in violation, and North Carolina with 12,328 river miles failing to meet standards.[13]

States have a vital role in protecting water quality. EPA has given 25 states the authority to approve and renew permits for pollution discharges directly into

GROWTH & THE ENVIRONMENT MAIN MATRIX (II) KEY

11. Total Water Consumption: 1985, in million gallons per day.

12. Water Consumption by End-Use: Percent water consumed for Agriculture/Commercial and Domestic/ Industrial/Thermoelectric in 1985.

13. Water Pollution, Rivers: River miles not meeting EPA designated-use standards, 1986; and percent of state river miles assessed.

14. Water Pollution, Lakes: Lake acres not meeting EPA designated-use standards, 1986; and percent assessed.

15. Water Pollution Permitting: S= state approves permits for discharges into surface waters; *= state issues permits for discharges into publicly owned treatment systems; E= EPA administers permitting program.

16. Water Pollution Permit Inspections: 1987-88, percent of public water treatment plants inspected for "pretreatment" permit compliance/ percent of major wastewater dischargers inspected for NPDES permit compliance. *= public treatment program state run.

17. Years of Remaining Municipal Landfill Capacity (estimated statewide average): >10 = more than 10 years; <5 = less than 5 yrs.

18. Percent Municipal Solid Waste Stream Recycled: *= WI, includes recycling of other waste streams. nd = no data.

19. Waste Reduction and Recycling Programs: Y= solid waste management plan or equivalent regs.; NC= solid waste plan not current; N= no solid waste plan/ M= mandatory recycling law; B= Beverage or container recycling law; P= packaging restrictions, labeling requirements.

20. Percent Change in Urban Land Area: 1960-1980. *HI : 1970-80.

21. Prime Farmland: In thousands of acres, 1982. nd= no data.

22. Land-Use Protection Laws: G= growth mgmt. law; C= excellent coastal zone program; W= inland, or freshwater, wetland protection law; P= purchase of farmland dvlp. rights; D= agricultural districting. *Data received too late for main report.

For sources, see page 12.

surface waters and for discharges into public wastewater treatment systems. In spite of this, state inspections of permit compliance are not always adequate. Kansas reviewed only 29 percent of its publicly-owned water treatment works (POTW's) for compliance with the federal pretreatment program. In the program, POTW's are responsible for ensuring that industrial facilities treat their wastewater before they discharge it into POTW's. Likewise, Michigan checked only 47 percent of its effluent permits issued to major facilities for discharging wastewater into surface waters under the National Pollutant Discharge Elimination System (NPDES). Major polluters include industrial, federal, and municipal facilities (such as POTW's), which discharge a high volume of waste into surface waters or are more likely to release toxic pollutants.[14]

Solid Waste Recycling

Solid waste is another area where inefficiency in managing environmental problems is extremely evident. Between 1960 and 1986 solid waste production increased by 80 percent, from 87.5 million tons to 157.7 million tons.[70] Much of this waste has been institutionalized by a "throw away" society that promotes disposability.

As the waste stream has expanded, pollution has forced many landfills to close. Some 70 percent of the landfills in operation in 1978 are closed today and new landfill construction has declined by more than 50 percent. Eight states are predicted to run out of landfill space within the next five years and 16 states will reach capacity in less than ten.

Still, an average of only ten percent of municipal waste is being recycled. Although a few states and municipalities are far ahead of the rest of the country, some analysts estimate as much as 70 percent of the waste stream can be recycled.[15]

Most extensive recycling programs are in the crowded northeast. New Jersey has mandated that all its counties recycle at least 25 percent of their waste within two years and New York plans a reduction of 50 percent by 1997. Florida, another fast growing state, recently passed a comprehensive solid waste law which puts a returnable deposit on containers made out of variety of materials, including glass, aluminum, plastic, and plastic-coated papers.

Although recycling programs are not yet the norm, savings from recycling can be substantial. The California Waste Management Board found that a curbside recycling program was $20 per ton cheaper than a program to collect and landfill the same waste. Similar conclusions have been reached about recycling in major cities such as New York, Seattle, and Minneapolis/St. Paul, and studies estimate that recycling creates 25 more jobs per 10,000 tons of trash than the equivalent landfill or waste incineration programs.[16]

Farmland Protection

Most states also lack comprehensive, long-term land-use policies. Instead a haphazard, piece-meal approach is usually taken, addressing issues individually, such as aquifer contamination, wetland filling, and the loss of valuable forest and prime farmland. Nationally, from 1960 to 1980, urban land area expanded by 22 million acres and the rural to urban conversion rate was approximately one million acres per year.[17]

Among the areas most at risk from urbanization is prime farmland. California lost 35,000 acres of "important" farmland between 1984-1986 and the fast-growing Baltimore/Washington corridor of Maryland has seen 150,000 acres disappear since 1982.[18]

Wisconsin has one of best farmland protection programs. The state gives farmers a generous property tax credit in exchange for a long-term farmland-use agreement. The credit is good only in counties that have developed state-approved agricultural preservation plans and exclusive agricultural use ordinances. Similar measures in other states are funded through property tax deductions which cut into local revenues. Wisconsin's tax credit, on the other hand, is funded through general state revenue.

Another effective measure is purchase of development rights (PDR) programs. Through these programs, states obtain preservation rights by paying farmers the difference between the agricultural value of the land and what a developer would pay. By the end of 1988, Maryland had protected 70,000 acres of farmland in PDRs.

Wetlands

Wetlands are also highly at risk from urbanization. From the mid-1950s to the early 1980s almost a million and a half acres of wetlands were converted to urban use and other developments. Until recently wetlands were considered unvaluable swamps, and were drained to construct condominiums, clear river channels, and build highways. Yet they have been recognized as aquifer recharge areas, critical to drinking water supplies. Cumulative losses of wetlands have also had a devastating impact on fish and wildlife, especially migratory birds, that rely on their habitat for survival.

Under provisions of the Clean Water Act, the Army Corp of Engineers issues permits for dredging and filling wetlands in U.S. waters and EPA has established environmental guidelines that wetland projects must meet. States also have wetland protection responsibilities. Virtually all

coastal states have laws regulating activities in coastal wetlands, but only 16 states have similar measures for inland, or freshwater wetlands. New Jersey passed a law in 1988, requiring development buffer zones of up to 100 feet around wetlands of exceptional importance. Michigan's freshwater wetlands program carries with it strong penalties for non-compliance and protects a broad range of wetland types.

Coastal Zones

Urban expansion and development pressure have had their greatest impact on coastlines. From 1950 to 1985, the number of people living within 50 miles of the coast increased from 73.5 million to 125 million, more than half of the U.S. population. To help states manage increasing human demands on coastal areas, the federal government passed the Coastal Zone Management Act in 1972. Under the law, states develop land-use plans for the "coastal zone" in exchange for federal funds. The plans must meet certain federal standards, including wetland, estuary, dune and barrier island protection.

Certain coastal zone management programs stand out above others. North Carolina maintains control over all permits for "major developments" in coastal areas of special environmental concern. The state also has strong erosion control regulations. No developments can be closer than 60 feet from the vegetation line of the shore, and in many cases they must be set further back. Maryland's law, protecting the Chesapeake Bay, is even tougher. It restricts development in the "critical area" to 1000 feet from the shoreline, and directs new building proposals to areas already intensely developed. Another excellent program is in California, which championed the "consistency" provision of the federal law, requiring that federal actions be consistent with state coastal plans. Using the provision, the state has objected to and stopped numerous proposals to develop offshore oil on the grounds it could harm the state's marine mammal population.

Growth Management Laws

In some states urbanization and rapid economic development are being addressed more comprehensively through growth management laws. These give state and regional governments authority over certain local land-use decisions to address the long-term effects of growth on "quality-of-life" issues. These issues usually include transportation bottlenecks, infrastructure maintenance, affordable housing, and open space.

Oregon's law, one of the first and best in the nation, require each of the state's 278 cities and counties to adopt land-use plans consistent with state goals and policies. The program pioneered the idea of urban growth boundaries, a designated limit beyond which urban services such as sewer and water are not provided, limiting urban sprawl and protecting open space, prime farmland, and wetlands.

Only a handful of states have passed growth management laws which they have enforced. But interest is growing. In 1988 four states approved growth management legislation, including Maine, Vermont, Delaware and Rhode Island; and New Jersey and Florida enacted comprehensive measures in 1986. Florida's law requires localities to submit growth management plans by July 1, 1990, and if they fail to comply, regional commissions will do the work and bill the localities.

New efficient technologies and environmental policies are not the ultimate solutions to population and economic growth problems. But they are essential in deflating major growth pressures. They are also a pragmatic step toward ideals for sustainable systems for water and energy consumption and land-use. At their best they provide an institutional framework to support long-term change and preserve precious resources for future generations.

Text Notes

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GROWTH AND THE ENVIRONMENT SNAPSHOT

Population growth stresses the environment, but it is only a contributing factor to our environmental crisis. Of more immediate significance is our use of inefficient technologies, our institutionalization of waste, and our failure to integrate environmental protection and resource conservation policies. The state that has addressed these concerns most comprehensively is Oregon. A key component of their growth management effort is their integrated land-use planning law, which requires localities to adopt plans consistent with state goals. These goals include the establishment of urban boundaries and the designation of zones for environmental protection and future economic growth.

The state has also made great strides in solid waste management, in energy conservation, in water pollution control, and in air pollution control.

Yet, there is still much room for improvement. Oregon's highly regarded land-use planning program has met with strong resistance from many local governments and permits for develoment activities are not always enforced. Meanwhile, 68 percent of Oregon's residents live in counties failing to meet EPA's clean air standards and the state has at least 77,900 lake acres and 2,106 river miles in violation of federal clean water standards. Additionally, the state has not adopted a building code with substantial energy-efficient standards, and does not have a current statewide solid waste plan.

Currently:

- only nine state have passed statewide land-use planning laws;
- 13 states have comprehensive policies for integrating least-cost planning in the investment decisions of utilities;
- only four states have no counties in violation of EPA's clean air standards, Arkansas, Hawaii, Mississippi, and North Dakota;
- 18 states have a statewide solid waste plan or equivalent regulations, and ten states have mandatory recycling laws;
- only nine states require a comprehensive under-the-hood inspection as part of their car emissions monitoring program.

The Final Scores

	Percent of Possible Points	*Total Points (out of 50)*	*Rank*	*Growth and the Envir.*
California	84	42	1	9
Oregon	**78**	**39**	**2**	**10***
Minnesota	76	38	3	8
Massachusetts	74	37	4	8
Wisconsin	74	37		8
Iowa	68	34	6	6
New Jersey	68	34		8
Florida	64	32	8	8
Maryland	64	32		7
Connecticut	60	30	10	7
Washington	60	30		6
Maine	58	29	12	7
North Carolina	58	29		7
New York	56	28	14	8
Pennsylvania	56	28		7
Rhode Island	56	28		7
Virginia	56	28		5
Georgia	54	27	18	6
Illinois	54	27		6
Vermont	54	27		7
Michigan	52	26	21	6
Idaho	50	25	22	3
Missouri	50	25		4
Ohio	48	24	24	6
South Carolina	48	24		4
Colorado	44	22	26	5
Delaware	44	22		5
Hawaii	44	22		5
New Hampshire	44	22		5
Texas	42	21	30	4
Arizona	40	20	31	4
Kansas	40	20		3
Nebraska	40	20		3
North Dakota	38	19	34	4
Montana	36	18	35	2
Alaska	34	17	36	3
Oklahoma	34	17		3
Alabama	32	16	38	2
Mississippi	32	16		1
New Mexico	32	16		3
Indiana	30	15	41	3
Kentucky	30	15		3
West Virginia	30	15		1
Wyoming	30	15		2
Nevada	28	14	45	3
Arkansas	26	13	46	1
South Dakota	26	13		2
Utah	24	12	48	3
Tennessee	22	11	49	2
Louisiana	20	10	50	2

Key:

Growth and the Environment Points are based on a scale of 1 to 10. The points were derived from the data in the matrices and measure the strength of state programs and policies to protect the environment. See "Ranking Notes" on page 12 for detailed explanation.

Total Points consist of a maximum score of 50 points. Each of the five topics in the 1989 main report have a maximum value of 10 points. (The five topics are: Forest Management, Drinking Water, Solid Waste Recycling, Food Safety, and Growth and the Environment.) The point values for each topic are added together to give the state's total point score.

Percent of Possible Points indicates each state's total points as a percentage of the total possible points.

Overall Ranking is the ranking of the states based on the total points received for all five topics. In the case of a tie each state is given the same ranking. Example: Both Maine and North Carolina received 29 points and tied for 12th place.

Summary Example: With 25 points, Idaho ranks 22nd in the nation for the strength of state environmental programs examined. For growth and the environment, Idaho received three points on a 10 point scale. The three points received for growth and the environment were added together with the points received for the remaining four topics to equal the total point score of 25.

* **Oregon** was judged to have the strongest programs and policies for growth and the environment and received 10 points (see Growth and the Environment Snapshot).

Ranking Notes

States have been ranked on the strength of environmental programs and policies on a scale of one to ten. The total rank is the compilation of points for the five topics examined (potential total of 50 points). The rankings are not meant to judge particular environmental conditions in each state, but consider environmental problems as a measure of need for program strength. Key factors weighed against this need are: legislative authority for programs, scope of established programs, extent of funding, monitoring, enforcement, and indications of progress. Although programs mandated by state legislatures, rather than innovative projects, are given greater weight, attention is given to assure that states have not simply "papered-over" a problem with new legislation.

The evaluation is both comparative and subjective and is not intended to represent an absolute scale in which the top state is doing everything possible to protect the environment on a given topic. For some topics, such as solid waste recycling, recent progress is very limited despite a few bright spots. And the overall comparison must also be taken within the general stall in momentum for environmental protection.

The rankings are based on research material and data drawn from a variety of sources: individual telephone and mail surveys of the states; information filed by the states with federal agencies; studies and surveys conducted by academic institutions, private contractors, and national environmental organizations; and information from peer reviewers.

In each case, we have used what we believe to be the best data available and noted the sources in the Matrix Notes. There are still shortcomings, however. Some of the data have a generic quality because of the need to use data in which the same criteria has been applied to all states. At times the most recent data of this type are two or three years old. Another problem is that state-supplied information can have varying levels of accuracy. Where a state is obviously out of line, we have contacted state officials to verify or correct information. A more difficult problem is reluctance of government officials to supply data on enforcement, monitoring, or budgets—which leaves us with record of a program in place, but no measure of its scope or effectiveness. A final shortcoming is the absence of adequate data for all of the states on a given subtopic.

The key indicators used in the ranking are contained in the matrix pages, and in some cases sub-matrices that will be published in a more detailed Focus Paper on each topic. Readers interested in more extensive information on a particular topic, or a state ranking on that topic, should request the appropriate Focus Paper (see inside back cover for ordering information).

Growth and the Environment

Rankings for growth and the environment considered six different policy areas: surface water pollution control, air pollution control, land-use planning, water conservation, energy conservation, and solid waste management. Land-use planning received greater weight due to its importance in managing growth. Water conservation received less weight due to a lack of comprehensive state-by-state data. Equal importance was given to the remaining categories.

In many of the categories, previous *State of the States* rankings were updated for this report. In land-use planning, additional consideration was given to whether growth management laws were being implemented and whether farmland protection programs were effective. In energy conservation, more weight was given to least-cost planning policies. And in air pollution control, car emission inspection programs and state emission and permit fees collections were given greater weight.

Growth and the Environment Matrix Sources

Population Statistics: U.S. Bureau of the Census, *Statistical Abstract of the U.S. 1988*.

Current Energy Consumption and Trends: U.S. Dept. of Energy, Energy Information Administration, *State Energy Data Report, 1960-1986*, 1988.

Energy-Efficient Building Codes: National Conference of States on Building Codes Standards, Herndon, Virginia, staff interview, 1986. Includes only states with comprehensive energy-efficient standards, although many states have minimal requirements.

Tax Credit for Renewable Energy Investments: U.S. Department of Energy, National Appropriate Technology Service (NATAS), *State Energy Tax Credit Summary*, 1987, and phone update with NATAS staff, September 23, 1988. States included if they provide tax credits for any renewable energy source, such as solar, wind, hydro, and cogeneration.

Least-Cost Policies: Critical Mass Energy Project, *Least-Cost Electrical Planning: Is There Really a State Movement?*, December 1985, and update by Energy Conservation Coalition staff, Washington, D.C., December 1988.

Carbon Emissions/Gross State Product: Renew America, *Reducing the Rate of Global Warming: The States' Role*, Washington, D.C., November 1988. Carbon emissions are for 1986 from burning oil, coal, and natural gas, expressed in million metric tons. Gross State Product is for 1986, from U.S. Department of Commerce, *Survey of Current Business*, May 1988.

Residents in Air-Polluted Counties: Compiled from list of counties in non-attainment of clean air standards as of June 1988, EPA, Air Quality Management Division, December 1988; county population statistics for 1985 from U.S. Bureau of the Census, "Local

Population Estimates," Series P-26, No. 85-52-C.

State Air Pollution Program Budgets: State and Territorial Air Pollution Program Administrators and Association of Local Air Pollution Control Officials, *Air Permit and Emissions Fees*, April 1987. In some cases the fees collected are placed in the general treasury and do not return directly to air pollution control budgets.

Car Emission and Inspection Programs: Northeast States for Coordinated Air Use Management, *Critical Analysis of the Federal Motor Vehicle Inspection Program*, July 1988.

Current Water Consumption and Trends: U.S. Geological Survey, *Estimated Use of Water in the U.S. in 1985*, , Washington, D.C., Circular 1004, 1988. Reflects "consumptive use," or the amount of water withdrawn not returning to ground or surface water supplies. This is not a measure of total water withdrawals. Also includes water losses from conveyance systems, and agriculture use includes water consumed for livestock and irrigation.

River Miles and Lake Acres Not Meeting Designated-Use Standards: EPA, *National Water Quality Inventory: 1986 Report to Congress*, November 1987. In some states only a small percent of the river miles and lake acres have been assessed, and therefore the data could significantly underestimate the actual pollution problem.

Water Pollution Permitting Programs and Inspections: EPA, Office of Water Enforcement and Permits, *NPDES & Pretreatment Spotlight*, December 1988. Inspection period, from July 1987 to June 1988.

Years Remaining Before Landfill Space Reaches Capacity: National Solid Waste Management Association (NSWMA), *Landfill Capacity in the U.S.: How Much Do We Really Have?*, October 1988. Alaska and Hawaii were compiled by phone interview with NSWMA staff, October 1988.

Percent Solid Waste Stream Recycled and State Solid Waste Management Plans: Council of State Governments, September 1987; Updates by state contacts, 1988.

Recycling/Packaging Legislation: compiled by Environmental Action as of July 19, 1988 and updated by American Paper Institute as of Oct. 16, 1988; Environmental Defense Fund, *Coming Full Circle*, New York, 1988; Richard Keller, Maryland Energy Office, 1988; American Paper Institute, Washington, DC, 1988.

Change in Urban Land Area: H. Thomas Frey, *Expansion of Urban Area in the U.S.: 1960-1980*, USDA, Economic Research Service, June 1983.

Prime Farmland: Acres from USDA, *1982 Natural Resource Inventory*. These are the most recent data available.

Growth Management Laws: "Growth Management and Governance," Dr. John DeGrove, Florida Atlantic University, prepared for Growth Management Conference, sponsored by the Urban Land Institute, September 1988.

Coastal Zone Management Programs: Beth Millemann, The Coast Alliance, Washington, D.C., staff interview, October 1988.

Wetland Protection Laws: EPA, *State Wetland Protection Programs: Status and Recommendations*, Deming Coles, et. al., 1986.

Farmland Protection Programs: National Association of State Departments of Agriculture (NASDA), "Current State Farmland Protection Activities," 1987, updated by NASDA staff, August 1988.

POPULATION MATRIX

	1	2	3	4	5	6	7
Alabama	4,083	4.9	4,410	5.5	60	40	1.58
Alaska	525	30.7	687	19.2	64.3	35.7	0.91
Arizona	3,386	24.6	4,618	23.1	83.8	16.2	2.55
Arkansas	2,388	4.5	2,529	4.2	51.6	48.4	1.95
California	27,663	16.9	33,500	15	91.3	8.7	5.14
Colorado	3,296	14.1	3,813	11	80.6	19.4	3.9
Connecticut	3,211	3.3	3,445	5.1	78.8	21.2	3.29
Delaware	644	8.3	734	10.2	70.6	29.4	3.78
Florida	12,023	23.4	15,415	20.3	84.3	15.7	3.14
Georgia	6,222	13.9	7,957	19.4	62.4	37.6	2.34
Hawaii	1,083	12.2	1,345	17.9	86.5	13.5	4.72
Idaho	998	5.8	1,047	3	54	46	3.31
Illinois	11,582	1.4	11,580	-0.3	83.3	16.7	5.5
Indiana	5,531	0.7	5,502	-0.9	64.2	35.8	3.48
Iowa	2,834	-2.7	2,549	-7.6	58.6	41.4	2.56
Kansas	2,476	4.7	2,529	1.5	66.7	33.3	3.12
Kentucky	3,727	1.8	3,733	-0.3	50.9	49.1	3.27
Louisiana	4,461	6.1	4,516	0.1	68.6	31.4	3.62
Maine	1,187	5.5	1,271	4.9	47.5	52.5	0.92
Maryland	4,535	7.5	5,274	11.5	80.3	19.7	4.05
Massachusetts	5,855	2.1	6,087	3.5	83.8	16.2	3.74
Michigan	9,200	-0.7	9,250	-0.5	70.7	29.3	4.25
Minnesota	4,246	4.2	4,490	3.8	66.9	33.1	2.1
Mississippi	2,625	4.1	2,877	6.6	47.3	52.7	2.06
Missouri	5,103	3.8	5,383	3.7	68.1	31.9	3.28
Montana	809	2.9	794	-1.4	52.9	47.1	3.53
Nebraska	1,594	1.6	1,556	-2	62.9	37.1	4.26
Nevada	1,007	25.8	1,303	21.1	85.3	14.7	2.87
New Hampshire	1,057	14.8	1,333	16.7	52.2	47.8	1.34
New Jersey	7,672	4.2	8,546	8.2	89	11	4.71
New Mexico	1,500	15.1	1,968	20.5	72.1	27.9	2.6
New York	17,825	1.5	17,986	1.2	84.6	15.4	7.22
North Carolina	6,413	9	7,483	11.8	48	52	2.43
North Dakota	672	2.9	629	-4.7	48.8	51.2	3.35
Ohio	10,784	-0.1	10,629	-1.5	73.3	26.7	3.78
Oklahoma	3,272	8.2	3,376	2.8	67.3	32.7	1.79
Oregon	2,724	3.4	2,877	4	67.9	32.1	3.9
Pennsylvania	11,936	0.6	11,503	-2.7	69.3	30.7	4.65
Rhode Island	986	4.1	1,049	4.6	87	13	4.53
South Carolina	3,425	9.7	3,906	10.1	54.1	45.9	2.23
South Dakota	709	2.7	714	0.8	46.4	53.6	3.02
Tennessee	4,855	5.7	5,266	5.9	60.4	39.6	2.17
Texas	16,789	18	20,211	14.1	79.6	20.4	2.82
Utah	1,680	15	1,991	12.1	84.4	15.6	2.94
Vermont	548	7.2	591	5.1	33.8	66.2	2.21
Virginia	5,904	10.4	6,877	11.7	66	34	2.98
Washington	4,538	9.8	4,991	7.2	73.5	26.5	3.59
West Virginia	1,897	-2.7	1,722	-7.3	36.2	63.8	3.53
Wisconsin	4,807	2.1	4,784	-0.5	64.2	35.8	3.35
Wyoming	490	4.4	489	-2.6	62.7	37.3	3.24

POPULATION
MATRIX NOTES

Column 1 — Resident population, 1987 (in thousands).

Column 2 — Percent change in population, 1980-1987.

Column 3 — Projected resident population in the year 2000 (in thousands).

Column 4 — Projected percent change in population, 1990-2000.

Column 5 — Percent of resident population urban, 1980.

Column 6 — Percent of resident population rural, 1980.

Column 7 — Number of urban residents per acre of urban land, 1980.

Source: U.S. Department of Commerce, Bureau of the Census, *1988 Statistical Abstract of the United States.* Column 7 was compiled by Renew America staff, using Census and U.S. Department of Agriculture data.

ENERGY CONSUMPTION MATRIX

	1	2	3	4	5	6	7	8
Alabama	660.5	210.2	508.3	124.9	54.2	1,454	4.6	-0.1
Alaska	12.2	208.3	244.8	0	8.3	474	9.4	7.1
Arizona	295.9	105.2	336.2	107.8	149.2	839	7	1.8
Arkansas	224.5	203	318.7	95.9	29	751	5.6	-0.4
California	42.5	1591	3245.5	283.3	466.9	6,471	4.4	0.7
Colorado	295.4	198.4	343.6	0.6	23.4	868	5	0.7
Connecticut	21.2	81.3	459.4	201.7	8.3	704	3	-0.3
Delaware	66.4	33.6	125.9	0	0	214	3.9	-0.7
Florida	459.4	298.9	1476.6	238.1	2.2	2,666	7.4	2.5
Georgia	692.5	286.6	756.8	78.2	22.2	1,828	6.8	1.7
Hawaii	0.4	2.7	226.7	0	0.8	231	6.6	0.1
Idaho	8.6	35.5	106	0	125.4	329	4.7	0
Illinois	787.4	943.7	1161.1	460.5	1.5	3,357	3.7	-1.3
Indiana	1149.2	398.7	795.8	0	5.2	2,221	3.8	-0.8
Iowa	262.1	209	346.1	32.3	9.8	894	3.7	-0.5
Kansas	251.7	308	402.6	75.2	0.1	972	3.3	0.1
Kentucky	749.9	173.5	464.8	0	28.2	1,301	3.3	0.4
Louisiana	171.9	1496.1	1359.4	115	0	3,229	6.1	0.1
Maine	9.3	2.5	219.2	67.5	57.6	329	4.4	-0.3
Maryland	275	158	467.2	138.6	19.4	1,140	4.5	-0.2
Massachusetts	99.8	191.2	853.3	26.2	41.5	1,279	3.3	-1.4
Michigan	811.9	689.4	890.2	132.5	14.5	2,586	4.1	-1.3
Minnesota	201.4	244.5	507.7	119.4	82	1,219	4.5	-0.1
Mississippi	108.8	220.2	405.1	44.2	0	883	6.7	0.6
Missouri	512.3	244.3	599.6	77.5	20.6	1,431	3.8	0.2
Montana	133.3	41.1	137.3	0	112	315	3.4	-0.6
Nebraska	109.9	104	196.9	82.8	17.3	489	4.2	-0.5
Nevada	161.6	35.8	142.4	0	47.3	295	7.8	1.9
New Hampshire	25.1	10.6	147.3	0	21.6	216	5.5	0.5
New Jersey	77.9	363	1273.2	159.6	-3	2,182	4.1	0.1
New Mexico	241.6	144.5	209.7	0	1.7	468	3	-0.1
New York	253.3	749.9	1710.1	238.7	466.2	3,397	3.2	-1.9
North Carolina	583.2	140.3	704.3	219.2	26	1,750	5.4	1.3
North Dakota	310.9	26.6	121.4	0	34.1	306	2	3.6
Ohio	1431.8	749.7	1108.1	0.3	1.8	3,553	2.7	-1.3
Oklahoma	217.9	570.7	419.1	0	30.5	1,208	4.5	1.3
Oregon	2.9	72.5	329	76.5	434.4	801	5.2	0
Pennsylvania	1318.4	631.9	1250.4	430.3	15	3,272	2.2	-2
Rhode Island	0.7	27.1	112.7	0	0.1	195	1.6	-1.2
South Carolina	263.9	101.5	356.6	385	13.1	1,081	5	1.9
South Dakota	29.2	23.4	101.8	0	59.2	198	2.5	0.9
Tennessee	607.4	194	578.1	-1.1	55	1,657	4.2	0.4
Texas	1162.7	3312.9	4135.1	0	20.2	8,780	4.7	0.7
Utah	189	99.7	198.5	0	14.6	478	3.3	0.4
Vermont	0.7	5	64.7	22.2	28	115	5.4	-0.3
Virginia	303.2	146.7	729.2	229.3	0.8	1,671	4.4	1.5
Washington	63.3	121.8	677.4	91.2	790.9	1,655	5.2	1.1
West Virginia	877.2	121.1	250	0	10.8	720	3.2	-1.8
Wisconsin	371.4	281.6	460.1	121	25	1,283	3.7	-0.2
Wyoming	336.6	78.8	117.7	0	11.8	346	5.4	1.6

ENERGY CONSUMPTION MATRIX NOTES

Estimated U.S. energy consumption by source, 1986, in trillions of BTU's.

Column 1 — Coal

Column 2 — Natural Gas

Column 3 — Petroleum

Column 4 — Nuclear Electric Power. Data is based on electricity sold or generated. * In Tennessee, no electricity generated by nuclear power was sold, but the plants operated and used energy from other sources. Thus, a negative consumption figure was given.

Column 5 — Hydroelectric Power. *In New Jersey, a negative consumption figure was given for the same reasons noted in column 4 for Tennessee.

Column 6 — Total energy consumption. Total in this column does not equal the sum of columns 1-5 due to the consideration of other factors, including electricty losses, exchanges, and consumption from sources not listed.

Column 7 — Average annual energy consumption growth rate, 1960-1973 (before oil embargo), in percent.

Column 8 — Average annual energy consumption growth rate, 1973-1986 (after oil embargo), in percent.

BTU= British Thermal Unit, the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit.

Source: U.S. Department of Energy, Energy Information Administration, *Current Energy Consumption and Trends: State Energy Data Report, 1960-1986,* 1988.

WATER POLLUTION CONTROL MATRIX

	1	2	3	4	5	6
Alabama	9	5	10	4	1	44
Alaska	5	5	1	5	1	99
Arizona	8	2	0	19	23	93
Arkansas	3	2	6	20	1	97
California	13	2	6	8	3	59
Colorado	14	2	4	4	0	93
Connecticut	11	2	20	10	5	91
Delaware	18	5	5	29	0	75
Florida	9	5	4	19	2	98
Georgia	0	5	0	10	2	96
Hawaii	45	5	0	18	0	95
Idaho	8	5	3	4	5	99
Illinois	4	5	11	14	7	99
Indiana	3	4	12	32	6	96
Iowa	13	5	3	6	3	93
Kansas	5	5	7	2	2	58
Kentucky	13	5	2	7	0	90
Louisiana	4	2	5	23	1	97
Maine	10	2	8	8	7	99
Maryland	9	4	4	19	2	51
Massachusetts	13	2	1	15	2	93
Michigan	6	5	21	39	15	94
Minnesota	5	5	14	12	4	100
Mississippi	6	5	0	5	0	82
Missouri	19	5	9	9	1	79
Montana	20	5	11	8	2	82
Nebraska	13	5	0	5	0	94
Nevada	33	5	33	0	0	26
New Hampshire	9	2	0	0	3*	88
New Jersey	11	5	13	25	8	53
New Mexico	14	3	0	10	3	99
New York	8	3	14	12	4	91
North Carolina	5	5	3	8	3	0
North Dakota	0	2	0	6	0	100
Ohio	13	5	12	32	6	90
Oklahoma	1	2	6	5	2	94
Oregon	22	5	0	0	0	91
Pennsylvania	2	4	13	15	5	77
Rhode Island	26	2	8	40	6	0
South Carolina	7	5	3	13	4	92
South Dakota	18	2	0	0	0	100
Tennessee	5	5	4	11	4	44
Texas	4	3	2	6	0	99
Utah	14	2	19	15	0	100
Vermont	22	2	0	17	11	0
Virginia	3	5	2	17	2	16
Washington	5	5	10	21	6	13
West Virginia	3	3	6	18	4	17
Wisconsin	37	5	7	12	2	98
Wyoming	0	5	0	0	0	100

WATER POLLUTION CONTROL
MATRIX NOTES

Column 1 — Major permit backlog. Percent of "major" facilities discharging waste into surface waters whose permits have expired and were awaiting reissuance as of October 1, 1988. "Major" polluters are industrial, municipal, and federal facilities which "discharge large volumes of wastes and/or have greater potential for discharging toxic pollutants."

Column 2 — State Toxic Water Pollution Control Programs. Program status, as of October 1, 1988, within EPA's assessment and approval process: 1= program has been reviewed by EPA; 2= action items (improvements) identified by EPA and sent to state; 3= revised toxics action plan sent by state to EPA regional office; 4= action plan negotiated between EPA and state; 5= action plan approved by EPA.

Colunm 3 — Industrial Non-compliance. Percent of "major" industrial wastewater dischargers in violation of permit requirements as of June 30, 1988.

Column 4 — Municipal Non-compliance. Percent of "major" municipal wastewater dischargers in violation of permit requirements as of June 30, 1988.

Column 5 — Failure to Enforce. Percent of "major" wastewater dischargers that are in violation of permit requirements and have not had enforcement actions taken against them within the six month time frame required by EPA (as of June 30, 1988). *Due to inconsistency in EPA figures, data for New Hampshire in column 5 is not consistent with data in columns 3 and 4.

Column 6 — Permit Reporting Requirements. Of the total discharge monitoring reports EPA expected to receive between July 1, 1988 and October 1, 1988, percent actually entered into EPA's permit compliance data system. Effluent monitoring reports are required monthly for most "major" permittees and provide critical information for assessing permit compliance. Reporting deficiencies reflect administrative problems at either EPA or the state, depending on who runs the program, and not the failure of permittees to submit reports. A failure to submit a report would be included in the non-compliance categories noted above.

Source: U.S. EPA, Office of Water Enforcement and Permits, *NPDES & Pretreatment Spotlight*, December 1988.

FARMLAND MATRIX

	1	2	3	4	5	6	7	8
Alabama	11,000	7,270	-1,200					
Alaska	1,400	nd	-100					
Arizona	37,000	1,090	-1,100					
Arkansas	15,400	11,624	-1,100					
California	32,600	5,891	-1,200	PDR	DIST.- 15,247,970		Tax Agree.	3
Colorado	34,000	1,686	-2,000					
Connecticut	440	355	-50	PDR- 13,143		agency		2
Delaware	620	430	-30			agency		1
Florida	13,000	1,104	-400					2
Georgia	13,000	7,728	-2,000			agency		1
Hawaii	1,950	296	-20				Tax Agree.	2
Idaho	13,800	3,413	-1,400					
Illinois	28,600	21,253	-200		DIST.- 72,009	agency		2
Indiana	16,200	13,510	-600					
Iowa	33,500	18,683	-300					
Kansas	47,900	25,602	-400					
Kentucky	14,500	6,050	-100		DIST.- 141,265	agency		2
Louisiana	9,700	12,975	-400					
Maine	1,520	1,273	-95					
Maryland	2,450	1,249	-300	PDR- 60,070	DIST.- 144,331	agency		3
Massachusetts	680	381	-40	PDR- 19,890		agency		2
Michigan	11,300	7,798	-100			agency	Tax Agree.	2
Minnesota	30,000	20,838	-300		DIST.	agency		3
Mississippi	13,800	10,340	-800					
Missouri	30,600	15,000	-700					
Montana	60,800	1,014	-1,100					
Nebraska	47,200	12,243	-500					
Nevada	8,800	313	-190					
New Hampshire	520	144	-25	PDR			Tax Agree.	2
New Jersey	850	863	-170	PDR- 1,258	DIST.- 20,084			2
New Mexico	44,600	615	-2,200					
New York	8,600	5,138	-800	PDR	DIST.- 8,045,551			2
North Carolina	10,800	5,679	-900	PDR- 640	DIST.	agency		2
North Dakota	40,500	13,912	-1,200					
Ohio	15,600	12,248	-600		DIST.- 2,000,000	agency		2
Oklahoma	33,000	15,049	-1,600					
Oregon	17,900	1,935	-200					3
Pennsylvania	8,500	4,285	-500	PDR	DIST.- 249,398	agency	Tax Agree.	3
Rhode Island	72	78	-2	PDR- 548				2
South Carolina	5,200	3,428	-1,200					
South Dakota	44,300	6,426	-700					
Tennessee	12,600	6,317	-1,000					
Texas	133,200	37,621	-5,000					2
Utah	11,300	787	-1,100					
Vermont	1,600	336	-140	PDR		agency		2
Virginia	9,600	5,032	-200		DIST.- 548,833	agency		2
Washington	16,000	2,308	-300	PDR*- 13,000		agency		1
West Virginia	3,700	539	-500					
Wisconsin	17,600	9,414	-1,000			agency	Tax Agree.	4
Wyoming	34,800	349	-200					

FARMLAND
MATRIX NOTES

Column 1- Land in agriculture, June 1, 1987 (in thousands of acres). Source: U.S. Department of Agriculture, National Agricultural Statistics Service, *Crop Production Report*, August 11, 1987.

Column 2- Prime farmland, 1982 (in thousands of acres). nd= no data. Source: U.S. Department of Agriculture, Soil Conservation Service, *National Resources Inventory*, 1982.

Column 3- Loss of land in agriculture, 1980-1987 (in thousands of acres). Source: USDA (same as column 1).

Column 4- States with a Purchase of Development Rights (PDR's) program and amount of farmland protected by PDR's as of January 1, 1988. In PDR programs state or local governments purchase development rights by paying farmers the difference between the market value and farm-use value of their land. States with PDR programs but no acres protected are generally new programs. *Washington's program is no longer active. Source: see below.

Column 5- States with an Agricultural Districting program (DIST.) and amount of farmland enrolled in districts as of January 1, 1988. Farmland enrolled in a district, usually a contiguous area of land, cannot be taken out of agricultural use for a fixed period of time. In exchange, farmers receive certain benefits such as property tax reductions and protection from nuisance claims. Source: see below.

Column 6- States requiring mitigation of farmland losses or disturbances caused by the activites or projects of public agencies (agency). Source: see below.

Column 7- States which provide tax credits or preferential tax rates to farmers for signing a farmland preservation agreement with the state. (Tax Agree.). Source: U.S. Department of Agriculture, Economic Research Service, *State Laws Relating to Preferential Assessment of Farmland*, 1987.

Column 8- An assessement of the effectiveness of state farmland protection programs. Scores range from 4= best program to 1= weakest program; no score= no program. The assessment considered the following farmland protection policies: compensatory programs such as PDR's, agricultural zoning or planning policies, legal regulations for state agency activity, agricultural districting programs, and conservation easement programs. Since some state laws and programs, such as Oregon's growth-management law, are not listed in the matrix, some states have scores but no programs listed. Source: Renew America interview with American Farmland Trust staff, October 1988.

Source for columns 4-6: National Association of State Departments of Agriculture (NASDA), *Farmland Project Report*, January 1987 and *Farmland Notes*, January 1988. Also, update interview with NASDA staff, August 1988.

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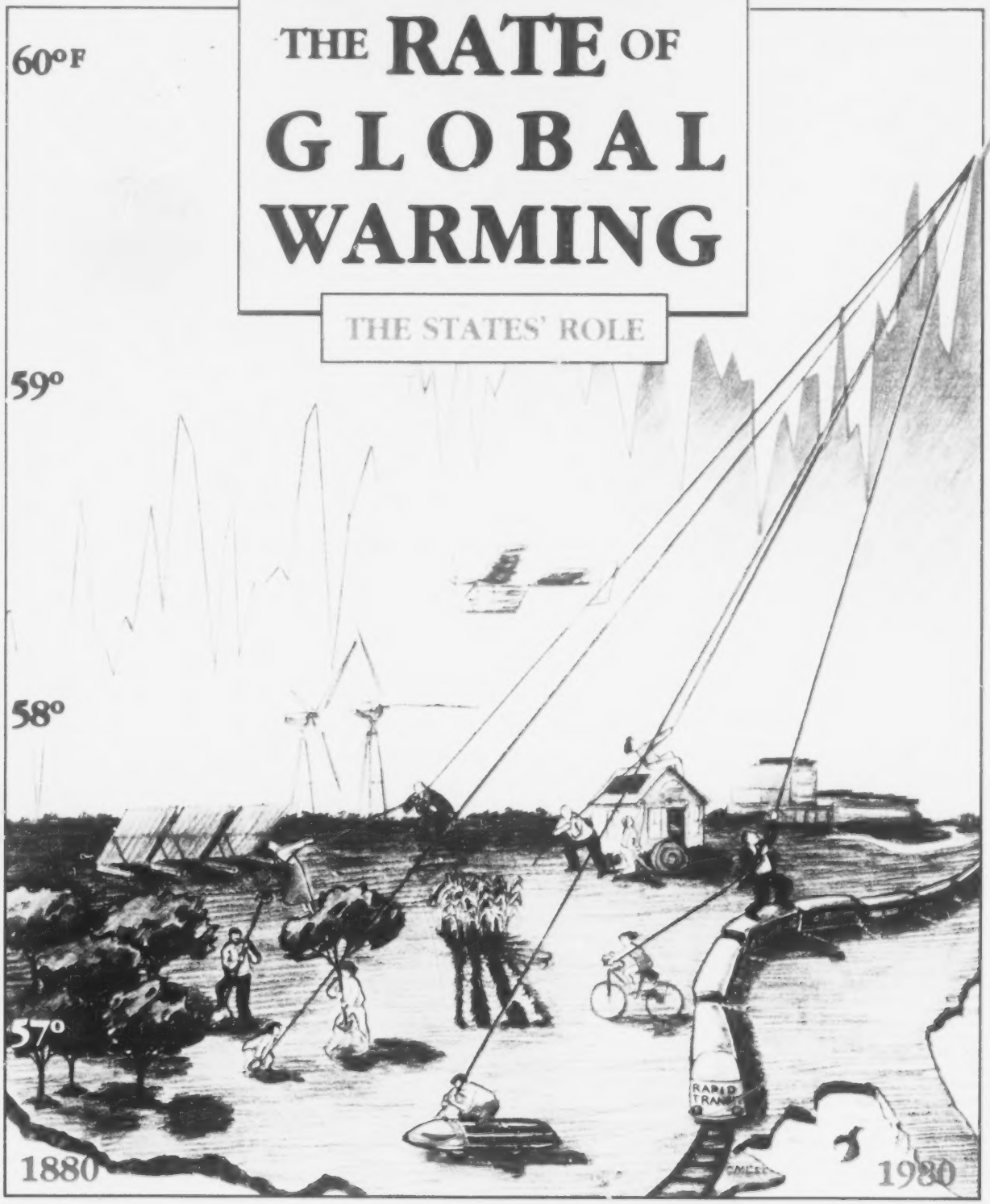
THE STATES' ROLE



RENEW AMERICA

REDUCING THE RATE OF GLOBAL WARMING

THE STATES' ROLE

Prepared By:
Sheila Machado
Rick Piltz

November 1988

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Executive Summary

Record-breaking temperatures during the summer of 1988 were reported on front pages across the country and made the "greenhouse effect" a household term. The long heat wave parched farmlands from New Mexico to Pennsylvania and from Idaho to South Carolina. For the South it was a second year of drought conditions. In the Midwest crop yields were rated from poor to very poor. In New England the heat wave drove electric consumption to a new high.

There is much debate about the relationship between the heat wave-drought conditions and the greenhouse effect, but certain facts stand out—the earth has warmed to a record level, and the four or five warmest years of this century have been in the 1980s.

Scientists believe that a warming of the global climate, due to man-made emissions of heat-trapping greenhouse gases, is almost certain and may have already begun. Unless this warming trend is halted, or radically slowed, it will produce a host of profound and irreversible ecological disturbances in the coming decades.

According to a forthcoming U.S. Environmental Protection Agency (EPA) report to Congress, unchecked global warming would have severe ecological and economic effects in the United States. More than just long, hot summers are in store. Sea levels will rise due to warming of the ocean, and polar ice caps may melt. As a result, coastal lowlands will be flooded. Climate changes will create unpredictable crop yields, stress on water resources, and economic dislocation. Averting such a disaster will require significant changes in public policy and uses of technology. More than just a strengthening of government regulations on air pollution, the changes require a fundamental transformation of our energy-supply system.(1)

There is no single, simple technological "fix" that will eliminate the greenhouse threat. Substituting nuclear power for fossil fuels may only result in a costly process of trading one set of environmental problems for another. Dealing with the challenge effectively will require a

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multiplicity of actions, and broad cooperative efforts—international, national, state and local, public and private. The actions we take in the United States will be critical.

With five percent of the world's population, the United States is responsible for roughly 20 percent of the global greenhouse effect. The United States is the single largest contributor to the atmospheric buildup of carbon dioxide (CO_2) from the burning of fossil fuels—coal, oil, and natural gas—in power plants, motor vehicles, industrial processes, and buildings.

Of the greenhouse gases, CO_2 makes the largest contribution—about half—to global warming. Substantially cutting CO_2 emissions is a crucial, and achievable, approach to the goal of stabilizing the atmospheric chemistry. At the same time, reducing fossil fuel consumption can help ease the problems of acid rain and ground-level ozone pollution.

The keys to reducing our use of fossil fuels are to implement major, across-the-board improvements in energy efficiency, and to make a transition to an energy system based on solar and other renewable non-fossil energy resources. Switching from coal and oil to natural gas in generating electricity would reduce CO_2 emissions in the short-term. How the federal government proceeds in dealing with the greenhouse effect will set a model for other nations.

There is an especially important role for the states. Most major federal environmental-protection laws rely heavily on the states for implementation, especially for compliance monitoring and enforcement. Many states already have laws and programs in place that can serve as building-blocks for a more aggressive strategy to reduce emissions of greenhouse gases. Some states have also played a pioneering role in developing creative approaches to promoting energy conservation and renewable energy.

The keys to reducing our use of fossil fuels are to implement major, across-the-board improvements in energy efficiency, and to make a transition to an energy system based on solar and other renewable non-fossil energy resources.

Global warming confronts us with extraordinary challenges: How do we effectively cope with a phenomenon that we have barely begun to experience—one which could completely alter our environment and shake our society to its foundations in the 21st century? How do we develop public understanding, make institutional decisions and commit the necessary resources to slow the rate of global warming?

Meeting these challenges will require farsighted and skillful leadership. The United States has a fundamental responsibility to provide this leadership through the actions of its public officials and private citizens.

This is the first report that attempts to track and quantify individual state carbon dioxide emissions contributing to the greenhouse effect, as well as state policies that may help reduce the rate of global warming. Information on other greenhouse gases is not yet available on a state-by-state basis. This report is not intended to be a comprehensive study of the problem, but an early indicator of possible nuts-and-bolts solutions based on current knowledge.

The information in the matrices shows indicators of the problem in each state, as well as information on current state policies and programs that could help reduce the rate of climate change. In a future report as additional information on greenhouse gases becomes available, we intend to rank states to show which are taking action to reduce emissions. We realize that state-by-state variations in emissions of greenhouse gases are due to a complex combination of economic and other factors, so caution

should be used in interpreting the data in a comparative context.

We encourage comments from readers that will improve our information base for doing a fair evaluation.

Some of the indicators are:

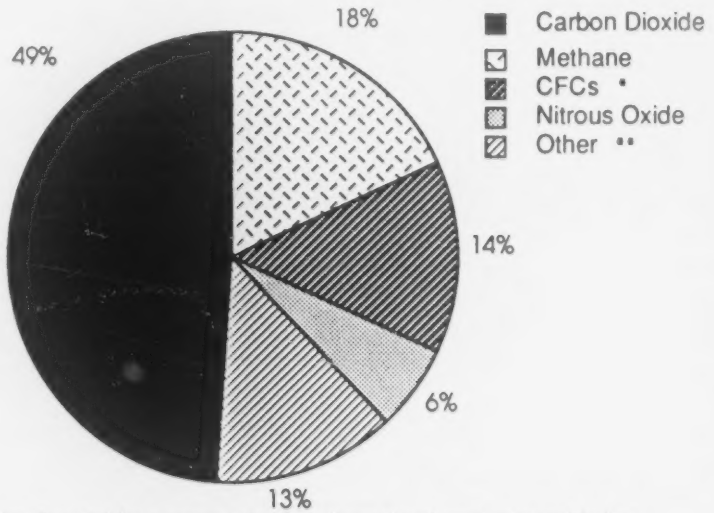
- From 1976 to 1986, 42 states reduced their petroleum emissions, but 38 states increased their coal emissions.
- Eighty million Americans in 30 states now live in areas that exceed EPA ozone-pollution standards.
- Electric power plants contribute 33.4 percent of total U.S. carbon emissions from fossil fuels. At least ten states have substantial statutory authority and policies requiring that utilities use least-cost planning and investment practices.
- Fifteen states offer alternative energy tax credits.
- Transportation contributes 31.8 percent of total U.S. carbon emissions from fossil-fuel use. Sixteen states fund ride-sharing programs. Seven states have state public transportation technical assistance programs independent of the federal Urban Mass Transportation Act (UMTA).

States can initiate action and provide models of effective programs, but a strong federal presence is required to ensure that all states implement effective policies. Increasing federal fuel-efficiency standards for cars and trucks is critical, and on other issues new federal legislation must provide incentives and deadlines for timely action in all states.

Moving expeditiously to reduce emissions of greenhouse gases will provide a wide array of benefits. Those steps can simultaneously strengthen the economy, lead to an efficient, renewable energy system, reduce our dependence on imported oil, give us an edge in technological innovation, reduce acid rain and other forms of air pollution, protect the stratospheric ozone layer, create new forests, reduce soil erosion, and promote a sustainable agriculture. On the other hand, failure to take the steps necessary to stabilize the earth's atmospheric chemistry could lead to an extraordinary combination of disasters.

Global warming is an unprecedented challenge to policymakers all over the world and the stakes are extremely high. Although a great deal is yet to be learned about global climate change, we know enough now to begin to take straightforward actions that will produce long-term benefits.

Estimated Relative Contributions to The Greenhouse Effect in the 1980s



Note: The first four gases listed are long-lived and mix well in the atmosphere, so their concentrations and greenhouse contributions can be measured fairly accurately. The "other" category is more uncertain because the gases are short-lived and their concentrations vary from one area to another.

Source: James Hansen, et al., *Journal of Geophysical Research*, 8/20/88.

* CFC-11 and CFC-12.

** Tropospheric ozone and other halocarbons.

WHY WE HAVE A WARMING TREND

When carbon dioxide and certain other gases are released into the atmosphere they surround the earth like a blanket, trapping the heat from the sun--this is the "greenhouse effect." The higher the concentration of greenhouse gases the more the temperature increases. Scientists have long anticipated the climate-warming trend, mainly due to the increased burning of fossil fuels—coal, oil, and natural gas.

The emission rate for each of the greenhouse gases has been increasing, as has their concentration in the atmosphere. The exact rate and amount of future warming is uncertain. But the average temperature of the earth is now warmer than at any time since record keeping started in the 19th century. The rate of warming appears to have accelerated in the past decade. (2)

Scientists estimate that a combined concentration of greenhouse gases equivalent to a doubling of pre-industrial carbon dioxide levels will produce an average global increase in temperature ranging from 1.5 to 5.5°C (2.7-9.9° F). Because of the delayed effects of the existing greenhouse gases, the earth is already committed to a few degrees of warming over the next 40-60 years. (3)

A temperature change of this magnitude occurred at the end of the last Ice Age, about 15,000 years ago, when a 5°C shift totally remapped the global ecosystem, completely changing the location of various types of forests. The global warming now underway is predicted to bring about changes far more rapidly than the changes that occurred at the end of the last Ice Age. Although it is not yet possible to predict how specific local areas will be affected, the changes in climate that will accompany this continuous warming are predictable in general. (4)

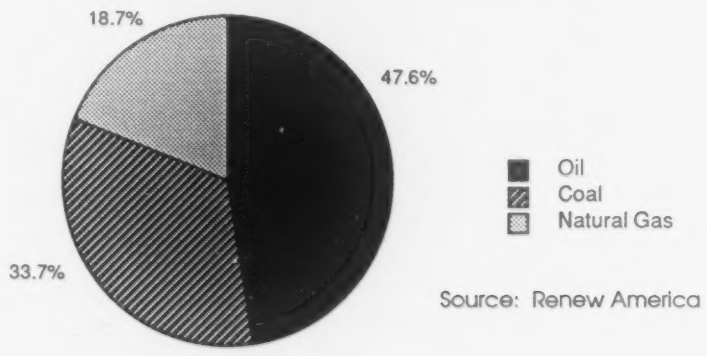
WHAT WILL HAPPEN?

In the United States, longer, hotter summers are expected. Sea water will expand as it warms, increasing sea levels by several feet and threatening coastal cities and developed areas, as well as causing the loss of beaches and wetland habitats. Polar ice caps may melt, causing even more massive flooding. Forests will die off on an unprecedented, region-wide scale. Warming will deplete fresh water resources through evaporation and cause soil to dry up. Farming patterns will be disrupted, with major losses in some parts of the country. Agricultural pests may spread northward into new regions.

In addition, wildlife habitat will be destroyed, and extinction of species could increase. Air quality will deteriorate. Rainfall patterns will change, and the frequency of extreme weather conditions will increase. Human mortality will probably increase. Some scientists believe there will be nonlinear, "quantum-leap" effects that will produce currently unpredictable, globally disruptive surprises. (5)

A great deal of our economy and infrastructure—our human settlement patterns, industry, food-production system, water-supply and flood-control systems — assumes a stable climate and a constant sea level. Noting "the close links between our society, the environment, and climate," an upcoming EPA report to Congress concludes that the findings of its study:

Figure 1
1986 U.S. Estimated Carbon Emissions by Fuel Type
(as percent of U.S. total emissions from fossil fuels)



"...collectively suggest a world that is different from the world that exists today....The landscape of North America will change in ways that cannot be fully predicted. The ultimate effects will last for centuries and will be irreversible. Strategies to reverse such impacts on natural ecosystems are not currently available." (6)

THE GREENHOUSE GASES

- **Carbon dioxide**
- **Chlorofluorocarbons and Halons**
- **Methane**
- **Nitrous oxide**
- **Tropospheric ozone**

Carbon Dioxide—Mainly a Fossil Fuel Problem

Carbon dioxide contributes about half to the impact of all greenhouse gases. While CO_2 is essential to life–without it altogether the earth would freeze–if the natural CO_2 balance is disturbed, the atmosphere overheats. Human activity adds CO_2, primarily through the burning of fossil fuels in transportation, electricity generation, industrial manufacturing, and heating of buildings. The quantity of carbon-dioxide emissions attributable to the burning of fossil fuels in the United States, and in each state, can be estimated using available data and formulas.

Figure 1 summarizes 1986 total U.S. carbon emissions by fossil-fuel type. Oil—including motor fuel, heating oil, and oil used in industrial processes — makes the largest overall contribution to the CO_2 build-up.

The 1986, 1976, and 1966 "Carbon Emissions from Fossil Fuels" matrices provide data on total state-by-state emissions, and the amount and percentage from each fossil-fuel type—oil, coal, and natural gas (See pp. 6, 19-21). The combustion of each fossil fuel varies in its emissions of carbon per unit of energy released. Coal releases the most CO_2 to produce a given amount of energy and natural gas the least. (Following standard practice, the matrices express emissions data in terms of tons of carbon, rather than CO_2. One ton of CO_2 contains 12/44 ton of carbon.)

The 1986 Carbon Emissions Matrix reveals wide variation among states in total emissions, with Texas having the highest total (154.87 million metric tons) and Vermont the lowest (1.31 million).

In West Virginia, coal accounts for 77 percent of the state's total carbon emissions, while in California coal's contribution is just one percent. Natural gas accounts for 41 percent of Louisiana's carbon emissions, while oil is the leading contributor in Hawaii (99 percent).

The 1986 Carbon Emissions Matrix also shows that states vary widely in their tonnage of carbon emissions per million dollars of gross state product (the total value of goods and services produced in the state). In general, the states with the higher emission rates on this indicator are those with the most coal-based electricity generating systems, or those with a heavy concentration of petrochemical plants. Those with a lower ratio of carbon emissions to economic product tend to have few coal-fired power plants.

A comparison of the 1986, 1976, and 1966 Carbon Emissions matrices shows that the 1275 million tons of U.S. total emissions from burning of fossil fuels in 1986 was 28 percent higher than the total in 1966. This increase was due to a substantial increase in consumption of both oil and coal. Over the most recent ten year period, the trend is more encouraging. Total carbon emissions were reduced by five percent from 1976 to 1986, as 42 states reduced their petroleum emissions. This reduction was slowed by increasing coal emissions in 38 states.

Carbon dioxide is the only greenhouse gas for which it is possible to calculate state-by-state emissions from fossil fuels. No federal agency or independent organization has broken down emissions of other greenhouse gases by state. However, the available carbon emissions data suggest how far the states still have to go in reducing fossil fuel burning.

1986 Carbon Emissions from Fossil Fuels

	Total Emissions (million metric tons)	Emissions from Oil (million metric tons)	Emissions from Coal (million metric tons)	Emissions from Natural Gas (million metric tons)	Emissions from Oil (% of total)	Emissions from Coal (% of total)	Emissions from Natural Gas (% of total)	Tons Carbon/ $Million GSP
	1	2	3	4	5	6	7	8
Alabama	28.99	9.50	16.50	2.99	32.8	56.9	10.3	527
Alaska	7.96	4.69	0.30	2.97	58.9	3.8	37.3	407
Arizona	15.16	6.27	7.39	1.50	41.4	48.7	9.9	285
Arkansas	14.62	6.11	5.62	2.89	41.8	38.4	19.8	462
California	85.23	61.47	1.07	22.69	72.1	1.3	26.6	160
Colorado	16.53	6.35	7.36	2.82	38.4	44.5	17.1	279
Connecticut	10.35	8.68	0.52	1.15	83.9	5.0	11.1	147
Delaware	4.51	2.38	1.65	0.48	52.8	36.6	10.6	385
Florida	43.55	27.83	11.46	4.26	63.9	26.3	9.8	245
Georgia	35.51	14.12	17.30	4.09	39.8	48.7	11.5	345
Hawaii	4.40	4.36	0.00	0.04	99.1	0.0	0.9	228
Idaho	2.73	2.01	0.22	0.50	73.6	8.1	18.3	207
Illinois	55.04	21.94	19.64	13.46	39.9	35.7	24.5	263
Indiana	49.13	14.76	28.68	5.69	30.0	58.4	11.6	579
Iowa	16.03	6.51	6.54	2.98	40.6	40.8	18.6	366
Kansas	18.20	7.52	6.29	4.39	41.3	34.6	24.1	429
Kentucky	30.01	8.81	18.72	2.48	29.4	62.4	8.3	565
Louisiana	51.73	26.11	4.29	21.33	50.5	8.3	41.2	695
Maine	4.43	4.17	0.22	0.04	94.1	5.0	0.9	256
Maryland	17.60	8.49	6.86	2.25	48.2	39.0	12.8	230
Massachusetts	21.70	16.48	2.50	2.72	75.9	11.5	12.5	188
Michigan	47.12	17.03	20.27	9.82	36.1	43.0	20.8	308
Minnesota	17.75	9.24	5.02	3.49	52.1	28.3	19.7	235
Mississippi	13.51	7.65	2.72	3.14	56.6	20.1	23.2	424
Missouri	27.44	11.18	12.78	3.48	40.7	46.6	12.7	329
Montana	6.32	2.42	3.32	0.58	38.3	52.5	9.2	520
Nebraska	7.96	3.73	2.75	1.48	46.9	34.5	18.6	300
Nevada	7.25	2.70	4.04	0.51	37.2	55.7	7.0	373
New Hampshire	3.58	2.80	0.62	0.16	78.2	17.3	4.5	193
New Jersey	31.21	24.08	1.95	5.18	77.2	6.2	16.6	202
New Mexico	12.01	3.90	6.04	2.07	32.5	50.3	17.2	509
New York	49.57	32.57	6.31	10.69	65.7	12.7	21.6	137
North Carolina	29.78	13.23	14.55	2.00	44.4	48.9	6.7	295
North Dakota	10.39	2.25	7.76	0.38	21.7	74.7	3.7	968
Ohio	67.21	20.78	35.74	10.69	30.9	53.2	15.9	382
Oklahoma	21.37	7.79	5.44	8.14	36.5	25.5	38.1	429
Oregon	7.28	6.17	0.07	1.04	84.8	1.0	14.3	176
Pennsylvania	65.57	23.66	32.90	9.01	36.1	50.2	13.7	357
Rhode Island	2.42	2.02	0.02	0.38	83.5	0.8	15.7	159
South Carolina	14.78	6.74	6.59	1.45	45.6	44.6	9.8	330
South Dakota	2.94	1.89	0.72	0.33	64.3	24.5	11.2	300
Tennessee	28.72	10.80	15.15	2.77	37.6	52.8	9.6	397
Texas	154.87	78.60	29.03	47.24	50.8	18.7	30.5	510
Utah	9.88	3.73	4.72	1.43	37.8	47.8	14.5	412
Vermont	1.31	1.22	0.02	0.07	93.1	1.5	5.3	152
Virginia	23.35	13.69	7.56	2.10	58.6	32.4	9.0	224
Washington	16.20	12.89	1.57	1.74	79.6	9.7	10.7	209
West Virginia	28.42	4.80	21.89	1.73	16.9	77.0	6.1	1179
Wisconsin	22.04	8.76	9.26	4.02	39.7	42.0	18.2	287
Wyoming	11.63	2.09	8.41	1.13	18.0	72.3	9.7	996
TOTAL	1275.30	606.96	430.35	238.01	47.6	33.7	18.7	306

(See pp. 22-23 for explanatory notes)

The best way to reduce carbon dioxide emissions from fossil fuels is to: 1) reduce fossil-fuel use through increases in end-use energy efficiency; 2) replace fossil-fuel combustion with alternative, renewable fuel sources; and 3) shift the fossil-fuel mix from higher to lower carbon-dioxide-emitting fuels.

Deforestation is also a major contributor of carbon dioxide to the atmosphere, through the burning and decay of trees. Planting trees can reverse this process and help reduce CO_2 levels. Forestry alone cannot solve the CO_2 problem, but it could play a significant role.

Figure 2 summarizes 1986 U.S. carbon emissions from various sectors—electricity generation, transportation, industrial/commercial, and residential.

Reducing the CO_2 build-up must be the main focus of state action to slow global warming. States have numerous possible tools for accomplishing this (For more discussion, see the "What States Can Do section of this report).

Chloroflourocarbons — Air Conditioners and Refrigerators

In contrast to other greenhouse gases, chlorofluorocarbons (CFCs) and the related bromine-containing compounds, the halons, are not naturally present in the atmosphere. CFCs have been manufactured during the past 50 years for use as solvents, refrigerator fluids, aerosol propellants, hospital sterilants, and foam packaging. Halons are used predominantly in fire extinguishers and firefighting practices. CFCs and halons destroy the life-protecting stratospheric (upper-atmospheric layer) ozone shield, allowing more harmful ultraviolet radiation into the lower atmosphere.

CFCs are used in an estimated 90 million car and truck air conditioners, 100 million refrigerators, air conditioners in 45 million homes and most buildings, and 30 million freezers.(7)

In 1987 representatives of most of the industrialized nations signed the Montreal Protocol, an agreement to cut CFC production in half by 1998. In 1988, the U.S. Congress ratified this pledge. However, in a September 1988 report, EPA concluded that, even with full worldwide participation in the Montreal Protocol, the concentration of ozone-depleting chemicals would at least double during the next 87 years—a phenomenon that would have very disturbing implications both for the stratospheric-ozone shield and for global warming. (8)

Simply put, the use of chlorofluorocarbons and halons must be eliminated absolutely as quickly as possible. Their ozone-depleting effects can be reduced in the short term through the use of alternative products. Currently, four states—Maine, Vermont, Massachusetts, and Rhode Island—ban or restrict the purchase of polystyrene (styrofoam) products. Massachusetts filed the nation's first lawsuit to stop the excessive emissions of CFCs.

States could also take the lead in using regulatory measures or economic incentives to promote CFC recovery and recycling, especially from refrigerators and automobile air conditioners. Recycling centers could be set up in cooperation with industry. (9) (Chlorofluorocarbons/Methane Matrix, p. 24)

Methane — Landfills, Cows, and Rice Paddies

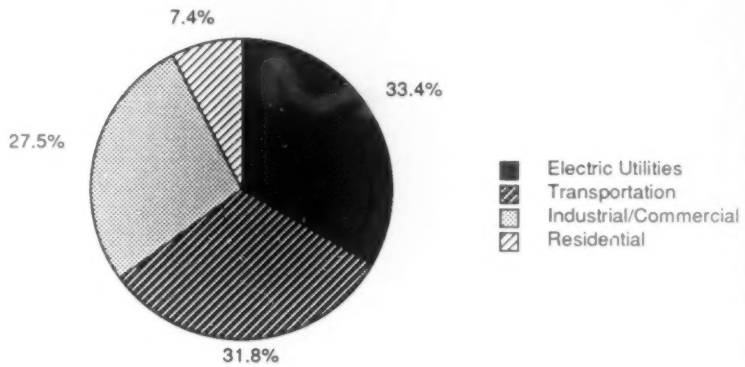
Methane is generated mainly by the bacterial decomposition of organic matter, particularly in flooded rice fields, wetlands, the digestive systems of certain animals, and landfills. Wood and agricultural waste-burning, pipeline leaks, and coal mining also contribute. Methane emissions are not well-documented, but are linked to population growth and agricultural and economic development.

Landfill gas consists of about 50 percent methane and is produced by the decomposition of solid waste. Recovering methane from landfills can reduce emissions, but not all landfills are suited for methane recovery, and further research is needed to document methane emissions. EPA lists 7,608 municipal waste landfills in the United States. Currently, 20 states have a total of 65 privately operated landfill recovery projects. (Chlorofluorocarbons/Methane Matrix, p. 24)

Nitrous Oxide — Fertilizer and Fossil Fuels

The sources of and amounts of nitrous oxide (N_2O) emissions are not fully understood. Some types of fossil-fuel combustion may be significant sources. Biomass burning, land conversion for agriculture, and nitrogen fertilizer use also affect N_2O levels. Recent research indicates that deforestation may be a significant future source of emissions. It may be possible to limit nitrous oxide emissions through combustion controls. Changes in fertilizer application practices and stopping deforestation could also slow the rate of N_2O emissions.

Figure 2
1986 U.S. Carbon Emissions by Sector
(as percent of U.S. total emissions from fossil fuels)



Source: Renew America

Tropospheric Ozone — Gasoline and Auto Emissions

Tropospheric (ground-level) ozone is toxic, and contributes to the greenhouse effect. Tropospheric ozone is produced as a result of chemical reactions among volatile organic compounds (VOCs) and nitrogen oxides (NOx). VOCs are a broad class of organic gases, such as vapors from gasoline and solvents. Nitrogen oxides come primarily from auto emissions and power plants, as well as gas stations, industrial fuel consumption, paint fumes, and dry cleaners.

Ozone air pollution is a public-health problem. Recent clinical studies show that concentrations of ozone are linked to long-term lung damage and, as with cigarette smoking, the effects build up over time. Eighty million Americans now live in areas that exceed EPA ozone-pollution standards.

The Ozone Scorecard Matrix (see p. 25) lists the 62 metropolitan areas in non-attainment for ozone based on their ozone levels from 1984-1986. As a consequence of the expiration of the Clean Air Act deadline for ozone-level attainment, EPA imposed a ban on the construction or expansion of air-polluting industries in the Los Angeles and Chicago areas. Thirteen additional areas may face similar action by early in 1989. EPA has given formal notice to 35 states to revise their implementation plans for ozone attainment.

The chemicals that react to produce tropospheric ozone, NOx and VOCs, are also among the principal components of the chemical reactions that produce acid rain, which threatens forests and aquatic ecosystems. Along the Appalachian Mountain chain the acidity of cloud moisture is ten times greater than at lower elevations, and about 100 times greater than that of unpolluted precipitation. (10)

As with acid rain, the transport of ozone over large distances threatens vegetation and crops. Extensive tree-damage and mortality due to ozone have been documented in pine forests in California and in the eastern states. Crop productivity is also impaired; an estimated $5 billion in annual crop losses can be attributed to air pollution. (11)

The Reforestation Matrix (see p. 31) shows that five states already have acid rain deposition-control programs: New York, Massachusetts, New Hampshire, Wisconsin, and Minnesota. But the heaviest acid-rain polluting states have yet to take action.

The Air Pollution Budgets Matrix (see p. 29) shows both

Electricity

	Emissions from Electric Utilities (% of total emissions)	% Emissions from Coal	% Emissions from Natural Gas	% Emissions from Oil	# of Coal Plants/ Planned Additions	Least-Cost Provisions	Wind Energy Programs
	1	2	3	4	5	6	7
Alabama	45.1	44.95	0.07	0.03	41/3	*	
Alaska	8.9	1.38	6.16	1.38	5/0	*	
Arizona	44.3	41.09	3.03	0.20	12 / 3	*	
Arkansas	40.0	37.00	2.94	0.07	5/0	**	
California	8.6	0.00	7.77	0.80	0/0	***	S/O
Colorado	42.2	41.74	0.42	0.06	31/3	*	
Connecticut	26.5	4.83	0.10	21.55	1/0	**	
Delaware	44.8	33.92	0.67	10.20	5/0	*	
Florida	43.0	25.07	5.60	12.35	27/2	***	
Georgia	45.9	45.51	0.23	0.17	38/1	*	
Hawaii	31.6	0.00	0.00	31.59	0/0	*	P/O
Idaho	0.0	0.00	0.00	0.00	0/0	**	
Illinois	30.7	29.49	0.16	1.02	63/0	***	S/O
Indiana	40.6	40.48	0.04	0.08	83/1	**	
Iowa	34.6	34.44	0.12	0.06	57/0	***	
Kansas	35.0	33.74	1.15	0.11	20/1	*	
Kentucky	54.8	54.72	0.03	0.10	59/2	*	
Louisiana	15.9	7.98	7.71	0.15	6/0	*	
Maine	12.0	0.00	0.00	11.96	0/0	***	
Maryland	32.2	28.64	0.17	3.41	13/1	**	
Massachusetts	30.4	10.92	1.01	18.43	9/0	**	S/P
Michigan	34.1	33.62	0.11	0.42	84/0	*	
Minnesota	25.1	24.96	0.11	0.06	53/2	**	S/T
Mississippi	25.5	19.02	5.18	1.26	9/0	*	
Missouri	43.0	42.82	0.07	0.11	50/1	**	
Montana	50.5	50.32	0.16	0.00	6/0	**	P/O
Nebraska	32.9	32.54	0.25	0.13	15/0		
Nevada	57.0	54.76	1.38	0.83	8 / 1	***	
New Hampshire	32.7	17.32	0.00	15.36	5/0	**	P/O
New Jersey	10.9	5.58	1.73	3.56	9/0	**	
New Mexico	52.4	49.79	2.50	0.08	13/2	**	
New York	25.1	8.07	3.97	13.03	28/0	**	
North Carolina	43.4	43.22	0.07	0.13	47/0	**	
North Dakota	54.8	54.67	0.00	0.10	14/1	*	
Ohio	42.4	42.27	0.01	0.10	130/1	**	
Oklahoma	37.3	23.54	13.71	0.05	10 / 1	*	
Oregon	0.0	0.00	0.00	0.00	1/0	***	
Pennsylvania	40.5	37.84	0.02	2.65	65/0	**	
Rhode Island	7.4	0.00	0.00	7.44	0/0	*	
South Carolina	33.5	33.29	0.14	0.07	24/0	**	
South Dakota	20.7	20.75	0.00	0.00	6/0	*	
Tennessee	43.7	43.59	0.00	0.10	37/0		
Texas	28.2	17.57	10.55	0.06	32/16	***	
Utah	39.4	39.17	0.00	0.20	18/2	*	
Vermont	1.5	0.76	0.00	0.76	0/0	***	
Virginia	22.7	20.17	0.04	2.53	22/0	**	
Washington	8.3	8.33	0.00	0.00	2/0	**	
West Virginia	67.4	67.28	0.00	0.14	33/0	*	
Wisconsin	36.6	36.34	0.14	0.14	61/0	***	
Wyoming	65.3	65.26	0.00	0.09	19/0	*	
Total	33.4	28.22	3.01	2.17	1276/44		

Electricity Matrix Notes

Column 1 - Carbon emissions from the production of electricity by electric utilities as a percent of the state's total carbon emissions. The data are calculated from the energy input at electric utilities for oil, coal, and natural gas.
Source for fuel consumption: "State Energy Data Report: Consumption Estimates 1960-1986," Energy Information Administration, U.S. Department of Energy, 1988. Also refer to the "Key" on p.22.

Columns 2, 3, 4 - Percent of carbon emissions from electric utilities by fuel type.
Source for fuel consumption: "State Energy Data Report: Consumption Estimates 1960-1986," Energy Information Administration, U.S. Department of Energy, 1988. Also refer to "Key" on p. 22.

Column 5 - Number of Coal Plants Operating/Planned Additions through 1996.
Note: Planned additions does not imply approval by state utility regulatory commissions.
Source: Inventory of Power Plants in the United States 1986, Energy Information Administration, Table 16, pgs 21-27.

Column 6 - Least Cost Provisions and Regulations
"***" = comprehensive regulatory authority and policies in place which require integrated planning and investment process for utilities. "**" = state has made some progress toward least-cost planning process and has some control over utility investment. "*" state has made little progress in implementing policies and authority to encourage least-cost strategies.
Source: Critical Mass Energy Project, "Least-Cost Electrical Planning: Is There Really a State Movement?," December 1985; see also "A Brighter Future, State Actions in Least Cost Electrical Planning," Energy Conservation Coalition, Washington, DC, December 1987.

Column 7 - Wind Energy Programs
"S/O" = State operating wind farms. "S/P" = State in the process of setting up wind farm. "S/T" = State is testing small wind turbines for possible implementation. "P/O" = Private development of wind farm in place.
Source: Tom Gray, American Wind Energy Association, phone conversation 10/7/88.

the federal and state and local contributions to fiscal 1988 air pollution budgets in each state.

WHAT STATES CAN DO

While a great deal of study is needed on greenhouse gases, there are practical actions states can take to reduce carbon dioxide emissions by promoting energy-efficiency and renewable energy alternatives in electricity generation, transportation, and other sectors, as well as through reforestation practices.

Electricity

Electricity generation is a major contributor to the carbon dioxide build-up—33 percent of the U.S. total carbon emissions from fossil fuels come from electric power plants. Of this amount, 84 percent comes from coal-fired plants, which account for 28 percent of total U.S. carbon emissions. There are 1276 coal-fired power plants in the United States, with 44 more planned by utilities. Of power-plant fuels, coal releases the most CO_2 to produce a given amount of energy.

[The state-by-state carbon emissions data in the Electricity Matrix reflect where the electricity is generated, not necessarily where it is put to end-use. Thus, in cases when a state imports power produced in a neighboring state, the data assign the carbon emissions to the state with the power plant that produced them.]

Switching to natural gas would reduce CO_2 emissions during a transition period while we convert to renewable fuels. In the long-term, it is imperative that we make this transition to an electricity-generating system based on renewable alternatives to fossil fuels, including solar, geothermal, wind, biomass, and hydroelectric power.

Some energy industry analysts claim that nuclear power offers a practical solution to global warming, because nuclear plants do not emit greenhouse gases. However, in extricating society from the threat of global warming, it is critical not to trade one set of problems for another. The nuclear option is less safe environmentally, as well as less economical, than a policy geared to energy-efficiency and renewable energy sources.

The threat of accidents from nuclear plants, as well as the still-unsolved problem of managing nuclear waste, continue to raise fundamental concerns about nuclear power. To attempt to replace current fossil-fuel plants with the equivalent generating capacity of nuclear power would be prohibitively expensive and time-consuming.

The nuclear-power industry has suffered major setbacks in most countries, including the United States. No new nuclear plants have been ordered in the United States since 1979, and 108 plants have been cancelled, including all of those ordered after 1974. Nevertheless, nuclear power advocates and federal officials remain committed to the nuclear option, and have been planning for a resurgence in construction of nuclear plants in the 1990s.

Energy Elegance

Since the 1970s, improvements in U.S. energy efficiency have been contributing far more in reducing fossil-fuel consumption, at a small fraction of the cost, than has been contributed by additions to nuclear-power capacity. Existing technologies and various practical measures, if deployed effectively, have the potential to radically reduce the carbon-dioxide build-up, while simultaneously strengthening the economy with cost-effective energy-efficiency investments. At the same time, substantially reducing energy demand will ease a transition to a renewable system. In 1978, federal officials estimated that 20 percent of the nation's energy supply could come from renewable energy sources by the year 2000.

The United States can benefit from these changes without waiting for other nations to act. The changes need not be draconian—high-efficiency energy technology and practices will actually save money, while better positioning the nation in the global marketplace.

Although reducing coal consumption will require coordinated state and federal efforts, state energy-efficiency policies and standards will make it possible to cut back on electricity use and thus slow the rate of global warming. Among the policy options are:

- "least-cost" planning for utilities;
- projects to generate electricity from renewable resources;
- joint state/utility energy-efficiency projects;
- stronger energy-efficiency standards for buildings;
- performance-based tax credits for conservation and renewable energy; and
- rebates for purchases of energy-efficient cars, appliances, and lighting.

Promoting least-cost utility services was a policy first adopted in the Pacific Northwest in 1980. The least-cost objective is to provide heating, cooling, lighting, and motor power at the lowest cost, and to incorporate energy-efficiency in the evaluation of cost-effectiveness. The Electricity Matrix shows that at least ten states have substantial statutory authority and policies requiring that utilities use least-cost planning and investment practices. (12)

California provides an outstanding model of the use of least-cost utility planning. As the result of adopting, under pressure, a plan to invest in energy-efficiency improvements, including utility-financed building weatherization, cogeneration, and voltage controls, as well as wind and solar power, California Pacific Gas and Electric was able to supply electricity to its customers at a higher profit without building $20 billion worth of coal

and nuclear plants it had previously planned. (13)

The Electricity Matrix also identifies four states that are operating or testing wind turbines, or are in the process of setting up a wind farm, while three states have private wind-farm operations.

The State/Utility Joint Energy Efficiency Projects Matrix (see p. 27) identifies 24 states that have joint energy-efficiency projects with utilities, including projects to conserve energy in residential and commercial buildings, industry, and agriculture. The projects, funded in part by federal energy programs, are diverse. Most offer energy-efficiency services, such as energy audits, and financial incentives to install energy-efficiency improvements. Some provide technical assistance and loans to businesses, while others support research and demonstration projects.

About one-third of CO_2 emissions from fossil fuels come from fuel consumed directly (that is, not including electricity use) in industry, commerce, and residences, for such purposes as heating of buildings and in manufacturing processes.

The Residential/Industrial/Commercial Matrix (see p. 26) shows eight states with substantial energy-efficiency building codes. Many others have set minimal requirements for new buildings. Nationwide, states have weatherized less than ten percent of low-income homes, though the matrix indicates that the figures are higher in most of the northern states. In some cases states have taken initiatives that became the basis for nationwide changes. For example, in 1984 California adopted appliance energy-efficiency standards for refrigerators and freezers. The federal government followed California's lead in passing the 1987 National Appliance Energy Conservation Act, which sets standards to be in effect by 1990 for refrigerators, freezers, water heaters, dishwashers, ranges, and clothes washers and dryers. It is projected that, by the year 2000, these standards will result in enough energy conservation to supplant the need for 22,000 megawatts of new generating capacity, the equivalent of 22 large power plants.

The appliance standards paved the way for the passage of nationwide fluorescent lamp-ballast standards in June 1988. Again the states were ahead of the federal government, with ballast standards in place in California, Connecticut, New York, Massachusetts, and Florida by the end of 1987. Studies show that fluorescent lighting accounts for ten percent of the nation's electricity consumption, while it lighting uses about 20-25 percent (the equivalent of nearly half of all the electricity produced from coal). An ordinary incandescent light bulb uses five times as much energy as a comparable fluorescent lamp. Massachusetts is the only state adopting energy-efficiency standards for commercial and industrial lamps.(14)

Fifteen states offer alternative energy tax credits, which are examined in the State Energy Tax Credits Matrix (see p. 28). These include, for example, credits for investments in solar water heaters, passive solar systems, photovoltaics, wind systems, biomass, geothermal, and hydroelectric energy. This number of states was much larger several years ago. Following the lead of the federal government, many states added alternative energy tax credits starting in the late 1970s. However, with the sharp curtailment of support for government initiatives to promote conservation and solar energy under the current Administration, it has been common for states to allow tax credits for renewables to expire over the past several years. The matrix shows that alternative energy tax credits currently in place will expire in the next few years unless action is taken to continue them.

Future state tax credits and other economic incentives should be performance-based. They should be carefully designed to derive the maximum energy-efficiency improvements and renewable-energy development per dollar invested, to ensure that such tax incentives are not abused, as they have been to some extent in the past.

An additional source of support for state energy conservation programs is the "oil-overcharge" funds that were allotted to the states. This money was obtained by the federal government from the oil companies because of price overcharges by the

Transportation

	1	2	3	4	5	6	7	8	9	10
	Transportation Emissions (% of total)	Motor Gasoline Emissions (% of total)	State Funding/ Public Transportation	Rideshare Funding	T. A. Program	R & D $	55 mph Limit	HOV Lanes	I/M Programs	I/M Standards
Alabama	23.5	16.5	417							
Alaska	36.4	6.4							C	Y/Y
Arizona	38.7	25.7	12,017					U	C	Y/L
Arkansas	27.9	19.5	321							
California	57.7	33.7	537,872	(a)		Y		Y	C	Y/Y
Colorado	33.1	22.6						Y	C	Y/L
Connecticut	38.3	31.8	76,159			Y	55		S	Y/N
Delaware	25.6	17.6	7,464	43	Y		55		C	N/N
Florida	44.8	30.9	9,834	417				Y		
Georgia	34.4	22.2	156,845			Y			C	N/Y
Hawaii	57.2	18.4					55	Y		
Idaho	57.6	39.3							C	N/L
Illinois	25.6	20.2	173,015	30	Y				C	N/N
Indiana	21.9	12.5	15,915			Y			C	Y/N
Iowa	26.4	19.3	3,572	117		Y				
Kansas	28.6	15.7								
Kentucky	21.9	14.4	902						C	N/Y*
Louisiana	23.7	10.0	3,522						C	N/L
Maine	44.9	31.1	400							
Maryland	36.2	27.6	211,949	82			55		C	N/N
Massachusetts	35.1	26.9	300,673	300			55		S	N/L
Michigan	26.5	20.9	98,354	345	Y	Y			C	N/N
Minnesota	37.1	25.8	24,628					U	N	Na
Mississippi	38.4	21.4	11							
Missouri	32.4	23.7	1,077						C	N/Y
Montana	25.4	15.6	70							
Nebraska	34.9	21.6	1,400							
Nevada	31.4	17.3	368						C	N/Y
New Hampshire	38.3	31.9	25	7					C	Na
New Jersey	49.9	26.7	131,180				55	Y	S	Y/N
New Mexico	26.7	15.5	1,600						C	Na
New York	33.2	28.2	1,041,147		Y	Y	55	Y	C	N/L
North Carolina	34.4	25.5	1,645	60		Y			C	N/Y
North Dakota	12.6	7.6								
Ohio	22.9	17.0	33,534		Y	Y			C	Na
Oklahoma	29.5	19.2	212	86					C	N/Y
Oregon	68.1	42.0	9,271						C	Y/Y
Pennsylvania	23.2	16.3	343,190				55	Y	C	Y/N
Rhode Island	46.2	38.3	11,551				55		S	N/N
South Carolina	36.5	27.2	1,142	11		Y				
South Dakota	40.3	29.4								
Tennessee	31.7	21.6	7,600	500		Y			C	Y*/N
Texas	25.8	13.7	4,888					Y	C	N/Y
Utah	28.3	18.2	24,080	70					C	N/L
Vermont	57.0	46.3	270		Y					
Virginia	44.0	28.7	53,959	670	Y	Y		Y	C	N/N
Washington	60.2	29.6	85,736	205				Y	C	Y/N
West Virginia	9.4	6.7	1,231							
Wisconsin	28.4	21.9	47,854						C	N/N
Wyoming	10.7	5.9	74							
U.S.	31.8	20.5	3,436,974	2,943						

Transportation Matrix Notes

Column 1 - Carbon emissions from the transportation sector as a percent of the state's total carbon emissions. The data are calculated from the transportation sector's fuel consumption of both oil and natural gas.
Source for fuel consumption: "State Energy Data Report: Consumption Estimates 1960-1986," Energy Information Administration, U.S. Department of Energy, 1988. Also refer to "Key" page 22.

Column 2 - Carbon emissions from the transportation sector for motor gasoline consumption as a percent of the state's total carbon emissions .
Source for fuel consumption: "State Energy Data Report: Consumption Estimates 1960-1986," Energy Information Administration, U.S. Department of Energy, 1988. Also refer to "Key" on p. 22.

Column 3 - State Funding/Public Transportation FY '86-87
State financial assistance in the form of revenues generated by a state-level tax and returned to local entities in the form of grants from the state. This form of assistance requires annual or biennial appropriation by the state legislators. Includes indirect financial assistance in the form of state-level taxes retained at the local level for transit purposes. This form of assistance does not show up on the state budget.
Source (Columns 3 - 6) : "1987 Survey of State Involvement in Public Transportation," American Association of State Highway and Transportation Officials; Washington, DC.

Column 4 - Rideshare Funding ($000s) - FY '87
Note: CA (a) - Included in public transit funds (separate data not included).

Column 5 - Technical Assistance Program/Public Transportation FY '87
State public transportation technical assistance program independent of the Urban Mass Transportation Act (UMTA).

Column 6 - Research & Development /Public Transportation FY '87
State provides matching funds for federal research and demonstration mass transportation projects and/or has mass transit demonstration or research program independent of the UMTA.

Column 7 - States that have maintained 55 mph speed limit.
Source: Institute for Highway Safety, Washington, DC, 7/11/88.

Column 8 - High Occupancy Vehicle (HOV) Lanes
"Y" = selected use of HOV lanes. "U" = HOV lanes under construction.
Source: "The Effectiveness of High-Occupancy Vehicle Facilities," Institute of Transportation Engineers, Washington, DC, 1988. And phone update with Larry King, U.S. Department of Transportation, 10/20/88.

Column 9 - Inspection/Maintenance (I/M) Auto Emissions Program
"C" = county/citywide; "S" = statewide; "N" = new 1989
Source (Columns 9 - 10) : "Critical Analysis of the Federal Motor Vehicle Control Program," NESCAUM (Northeast States for Coordinated Air Use Management), July, 1988.

Column 10 - (I/M) Tight Standards/Underhood Inspection
"Y" = Yes; "N" = No; "Na" = Not available; "L" = Limited; "*" = applies to some counties/cities but not to others. Note: Tight emissions standards and underhood inspection assessment by Mike Walsh in "Critical Analysis of the Federal Motor Vehicle Control Program."

companies between 1973 and 1981, when price controls were in effect. State governments have received roughly $3 billion so far, which they are putting into new or existing energy programs (see Oil Overcharge Funds Matrix, p. 29).

The largest portion of the settlement resulted in the distribution to the states of $2.1 billion received from Exxon Corporation, earmarked for five programs designed to assist energy consumers—the Low-Income Weatherization Assistance Program, the Low Income Home Energy Assistance Program, the State Energy Conservation Program, the Energy Extension Service, and the Institutional Conservation Program (also referred to as the Schools and Hospitals Weatherization Program). The Oil Overcharge Funds Matrix indicates the total amount allocated to each state, as well as the amounts approved so far specifically for energy-conservation programs. These funds represent a one-time distribution of resources, which states can use to meet vital needs. (15)

Transportation—Cars, Cars, Cars

Transportation is a major contributor to the carbon-dioxide buildup, accounting for 31.8 percent of total U.S. carbon emissions from fossil-fuel use. The Transportation Matrix shows carbon emissions from the transportation sector--cars, buses, trucks, trains, and airplanes--as a percentage of each state's total emissions.

Cars and light trucks are now the single largest oil-using subsector in the U.S. economy. There are now nearly 120 million cars on the nation's roads, 2.5 million more than in 1986. The Transportation Matrix also shows each state's carbon emissions from motor gasoline as a percent of total emissions.

Since the oil-price shock of 1979, fuel economy gains have held transportation oil use steady despite the increasing number of vehicles on the road. But now that energy-efficiency measures have been scaled back, oil consumption is rising again. In the first quarter of 1988, transportation oil use grew by more than six percent.

In October, 1988, the U.S. Department of Transportation rolled back the Corporate Average Fuel Economy (CAFE) standards for passenger cars from 27.5 to 26.5 miles per gallon. While increasing fuel efficiency is an important way to reduce CO_2 emissions, lowering the standard takes a step backward.

The national average fuel economy of 14.2 mpg for all motor vehicles, including trucks (estimates based on U.S. Department of Transportation 1986 data) can and must be dramatically improved. The State Miles Per Gallon Matrix (see p. 30) shows the 1986 average fuel economy for all motor vehicles in each state. The figures on vehicle miles of travel are calculated estimates based on data submitted by the states. Inferences about variation from one state to another should be drawn carefully. But it is clear that there is a great deal of room for improvement in every state.

Some cars now on the market get more than 45 mpg; prototypes get more than 60. If we increased the average fuel economy of new cars in the United States to 45 mpg and of light trucks to 35 mpg by 1995, the net result would be a savings of oil of 1.9 million barrels per day by the year 2000. This is more than six times the projected average daily oil production from the Arctic National Wildlife Refuge (ANWR) over a 30-year period. In fact, such achievable improvements could save more than the combined production of oil from Alaska, plus the offshore Pacific Coast and Atlantic Coast reserves.

In addition, alternatives to oil, such as hydrogen and ethanol (alcohol fuel) must be seriously considered. Over time, it will be necessary to make a transition to an energy system relying almost entirely on renewable sources, including renewable liquid fuels for transportation.

State and local officials continue to plan for more automobile traffic and additional freeways. But it is clear that efforts are needed to reduce the use of the automobile with public transportation incentives, as well as further study and use of

alternative modes of transportation, such as light rail, train, and bicycle.

States can reduce gasoline consumption and auto emissions through support for public transportation alternatives. The Transportation Matrix shows state funding provided to local governmental entities for public transportation. Seven states have state public transportation technical assistance programs independent of the federal Urban Mass Transportation Act (UMTA). Twelve states provide matching funds for federal research and demonstration mass transportation projects and/or have mass-transit research or demonstration programs independent of UMTA.

States can also act to improve efficiency and reduce emissions from automobiles. For example, the Transportation Matrix identifies 16 states that fund ridesharing programs, and shows funding levels. Nine states have maintained the 55 mph speed limit. Nine states have high-occupancy-vehicle lanes. Four states have statewide inspection and maintenance programs for motor-vehicle exhaust-emission systems, and 29 states have city- or county-wide programs.

Reforestation — The Carbon Dioxide Sink

Trees remove carbon dioxide from the atmosphere through photosynthesis. When trees are cut or burned, or when they decay, the CO_2 they contain is released into the atmosphere. The current rapid destruction of tropical rainforests is a major contributor to the greenhouse effect. Reforestation, on the other hand, can increase storage of CO_2, offsetting emissions from fossil fuel burning.

The Reforestation Matrix (see p. 31) shows the forest land area in each state, the percentage of the state that is made up of forest land, and the increase or decrease in forest land area over the past decade.

The matrix also shows the area planted in trees in each state as part of the federal Conservation Reserve Program (CRP). Enacted as part of the Food Security Act of 1985 (the Farm Bill), the CRP provides a great opportunity for reforestation. Under this program, farmers are paid a fee to remove highly erodible cropland from production for at least ten years and plant it with a soil-conserving crop, primarily grasses and trees.

The CRP has been hailed as the greatest tree-planting program in the nation's history, although tree-planting has fallen short of the original goals set forth in the 1985 Farm Bill, i.e., that 12.5 percent of the total enrolled CRP acres be converted to trees. In 1987, a record-breaking three million acres of trees were planted in the United States, one million of which were attributable to the CRP program. Most of the reforestation is taking place in the South and Mid-Atlantic states, where soil and climate conditions are conducive to growing commercially valuable softwood species. One possible approach would be to require new carbon dioxide sources, such as electricity generating plants, to establish enough new forest land to offset their CO_2 emissions. Such a policy could simultaneously promote the expansion of Conservation Reserve acreage, reduce soil erosion, improve wildlife habitat, and enhance recreational opportunities, as well as stimulate energy-efficiency investments and research on cheaper methods to reduce CO_2 buildup. The practical implications of CO_2 offsets as a state policy approach require further investigation. (16)

Urban tree-planting, too, can offset fossil fuel emissions of CO_2, as can the use of light-colored surfaces–for example, making parking-lot surfaces light-colored. Planted strategically, trees can also shade buildings and pavement, thus cooling "heat islands" and reducing energy demand. A tree that provides shade can indirectly cause reductions in CO_2 emissions equivalent to 15 times the amount of CO_2 the tree alone can absorb.

One acre of trees can absorb an estimated four tons of carbon annually, the amount released by burning 1000 gallons of gasoline. The American Forestry Association has launched a nationwide "Global ReLeaf" campaign to encourage Americans to plant 100 million trees in their communities by 1992. This could save U.S.ratepayers an estimated $3-4 billion annually while offsetting 18 million tons of carbon emissions. (17)

TEXT NOTES

1. U.S. Environmental Protection Agency, *The Potential Effects of Global Climate Change on the United States*, Draft Report to Congress, Executive Summary, Oct. 1988.

The U.S. Environmental Protection Agency will soon be releasing two reports to Congress on global warming. The first will deal with potential effects on the U.S. ecosystem of global climate change, and will probably be available in January 1989. The second will deal with policy options for stabilizing greenhouse emissions, and should be available shortly thereafter. A limited number of copies will be available to the public through EPA. Write: Environmental Protection Agency, Office of Policy, Planning, and Evaluation, Attn: Dennis Tirpak, PM-220, 401 M Street, S.W., Washington, D.C. 20460.

The reports will also be available from the U.S. Government Printing Office, or may be obtained through the office of one of your congressional representatives.

2. Testimony of G.M. Woodwell, Woods Hole Research Center, and James E. Hansen, NASA Goddard Institute for Space Studies, before the U.S. Senate Committee on Energy and Natural Resources, June 23, 1988; EPA, Office of Policy, Planning, and Evaluation, October 27, 1988.

3. Woodwell, June 23, 1988. Different sources estimate somewhat varying ranges.

4. Testimony of Dr. Stephen Schneider, National Center for Atmospheric Research, before the U.S. House Subcommittee on Water and Power Resources, Sept. 27, 1988.

5. EPA, October 1988; Schneider, Sept. 27, 1988.

6. EPA, October 1988, p.7.

7. Douglas G. Cogan. *Stones in a Glass House: CFCs and Ozone Depletion*. Investor Responsibility Research Center, Washington, D.C., 1988.

8. "EPA Urges Halt in Use of CFCs," *Washington Post*, Sept. 27, 1988.

9. Environmental Defense Fund, *Protecting the Ozone Layer: What You Can Do*, New York, N.Y., 1988.

10. James J. MacKenzie and Mohamed T. El-Ashry, "Killer Air," *Washington Post*, Sept. 29, 1988.

11. MacKenzie and El-Ashry, Sept. 29, 1988.

12. William U. Chandler, et al., *Energy Efficiency: A New Agenda*. American Council for an Energy-Efficient Economy. Washington, D.C., 1988, p.37.

13. Michael Oppenheimer, "Safe Energy Options: Best Hope for Global Warming." Safe Energy Communications Council, Washington, D.C., 1988.

14. Alan B. Durning, "The Coalfield Overhead," *World Watch*, July-Aug., 1988, p.7.

15. "State Uses of Exxon and Stripper Well Oil Overcharge Funds," National Consumer Law Center, Washington D.C., 1988.

16. Daniel J. Dudek, *Offsetting New* CO_2 *Emissions*. Environmental Defense Fund, September 1988.

17. Art Rosenfeld, Lawrence Berkeley Laboratory, Berkeley, CA, Oct. 21, 1988; American Forestry Association, "Global ReLeaf News," Oct. 12, 1988. Also see Sandra Postel, "A Green Fix to the Global Warming," *World Watch*, Sept.-Oct. 1988.

A Note On The Data Sources

The data in this report are drawn from a variety of sources. In each case we have used what we believe to be the best data available.

Covering all 50 states systematically, applying the same criteria to each state, gives the data a somewhat generic quality. At times the most recent information is two or three years old. Data supplied by the states to federal agencies can have varying levels of accuracy. Adequate data may not be available for all states on a given subject. If you know of additional sources of national data on the issues discussed in this report, we would appreciate hearing from you.

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1986 Carbon Emissions from Fossil Fuels

	Total Emissions (million metric tons)	Emissions from Oil (million metric tons)	Emissions from Coal (million metric tons)	Emissions from Natural Gas (million metric tons)	Emissions from Oil (% of total)	Emissions from Coal (% of total)	Emissions from Natural Gas (% of total)	Tons Carbon/ $Million GSP
	1	2	3	4	5	6	7	8
Alabama	28.99	9.50	16.50	2.99	32.8	56.9	10.3	527
Alaska	7.96	4.69	0.30	2.97	58.9	3.8	37.3	407
Arizona	15.16	6.27	7.39	1.50	41.4	48.7	9.9	285
Arkansas	14.62	6.11	5.62	2.89	41.8	38.4	19.8	462
California	85.23	61.47	1.07	22.69	72.1	1.3	26.6	160
Colorado	16.53	6.35	7.36	2.82	38.4	44.5	17.1	279
Connecticut	10.35	8.68	0.52	1.15	83.9	5.0	11.1	147
Delaware	4.51	2.38	1.65	0.48	52.8	36.6	10.6	385
Florida	43.55	27.83	11.46	4.26	63.9	26.3	9.8	245
Georgia	35.51	14.12	17.30	4.09	39.8	48.7	11.5	345
Hawaii	4.40	4.36	0.00	0.04	99.1	0.0	0.9	228
Idaho	2.73	2.01	0.22	0.50	73.6	8.1	18.3	207
Illinois	55.04	21.94	19.64	13.46	39.9	35.7	24.5	263
Indiana	49.13	14.76	28.68	5.69	30.0	58.4	11.6	579
Iowa	16.03	6.51	6.54	2.98	40.6	40.8	18.6	366
Kansas	18.20	7.52	6.29	4.39	41.3	34.6	24.1	429
Kentucky	30.01	8.81	18.72	2.48	29.4	62.4	8.3	565
Louisiana	51.73	26.11	4.29	21.33	50.5	8.3	41.2	695
Maine	4.43	4.17	0.22	0.04	94.1	5.0	0.9	256
Maryland	17.60	8.49	6.86	2.25	48.2	39.0	12.8	230
Massachusetts	21.70	16.48	2.50	2.72	75.9	11.5	12.5	188
Michigan	47.12	17.03	20.27	9.82	36.1	43.0	20.8	308
Minnesota	17.75	9.24	5.02	3.49	52.1	28.3	19.7	235
Mississippi	13.51	7.65	2.72	3.14	56.6	20.1	23.2	424
Missouri	27.44	11.18	12.78	3.48	40.7	46.6	12.7	329
Montana	6.32	2.42	3.32	0.58	38.3	52.5	9.2	520
Nebraska	7.96	3.73	2.75	1.48	46.9	34.5	18.6	300
Nevada	7.25	2.70	4.04	0.51	37.2	55.7	7.0	373
New Hampshire	3.58	2.80	0.62	0.16	78.2	17.3	4.5	193
New Jersey	31.21	24.08	1.95	5.18	77.2	6.2	16.6	202
New Mexico	12.01	3.90	6.04	2.07	32.5	50.3	17.2	509
New York	49.57	32.57	6.31	10.69	65.7	12.7	21.6	137
North Carolina	29.78	13.23	14.55	2.00	44.4	48.9	6.7	295
North Dakota	10.39	2.25	7.76	0.38	21.7	74.7	3.7	968
Ohio	67.21	20.78	35.74	10.69	30.9	53.2	15.9	382
Oklahoma	21.37	7.79	5.44	8.14	36.5	25.5	38.1	429
Oregon	7.28	6.17	0.07	1.04	84.8	1.0	14.3	176
Pennsylvania	65.57	23.66	32.90	9.01	36.1	50.2	13.7	357
Rhode Island	2.42	2.02	0.02	0.38	83.5	0.8	15.7	159
South Carolina	14.78	6.74	6.59	1.45	45.6	44.6	9.8	330
South Dakota	2.94	1.89	0.72	0.33	64.3	24.5	11.2	300
Tennessee	28.72	10.80	15.15	2.77	37.6	52.8	9.6	397
Texas	154.87	78.60	29.03	47.24	50.8	18.7	30.5	510
Utah	9.88	3.73	4.72	1.43	37.8	47.8	14.5	412
Vermont	1.31	1.22	0.02	0.07	93.1	1.5	5.3	152
Virginia	23.35	13.69	7.56	2.10	58.6	32.4	9.0	224
Washington	16.20	12.89	1.57	1.74	79.6	9.7	10.7	209
West Virginia	28.42	4.80	21.89	1.73	16.9	77.0	6.1	1179
Wisconsin	22.04	8.76	9.26	4.02	39.7	42.0	18.2	287
Wyoming	11.63	2.09	8.41	1.13	18.0	72.3	9.7	996
TOTAL	1275.30	606.96	430.35	238.01	47.6	33.7	18.7	306

1976 Carbon Emissions from Fossil Fuels

	Total Emissions (million metric tons)	Emissions from Oil (million metric tons)	Emissions from Coal (million metric tons)	Emissions from Natural Gas (million metric tons)	Emissions from Oil (% of total)	Emissions from Coal (% of total)	Emissions from Natural Gas (% of total)
	1	2	3	4	5	6	7
Alabama	29.68	10.56	15.80	3.32	35.6	53.2	11.2
Alaska	4.52	2.89	0.34	1.29	63.9	7.5	28.5
Arizona	12.06	6.00	3.49	2.57	49.8	28.9	21.3
Arkansas	11.22	7.59	0.09	3.54	67.6	0.8	31.6
California	92.85	64.82	1.66	26.37	69.8	1.8	28.4
Colorado	15.31	6.75	4.62	3.94	44.1	30.2	25.7
Connecticut	12.39	11.41	0.03	0.95	92.1	0.2	7.7
Delaware	4.54	3.76	0.50	0.28	82.8	11.0	6.2
Florida	37.85	30.02	3.54	4.29	79.3	9.4	11.3
Georgia	26.89	14.38	8.68	3.83	53.5	32.3	14.2
Hawaii	4.48	4.48	0.00	0.00	100.0	0.0	0.0
Idaho	3.63	2.54	0.38	0.71	70.0	10.5	19.6
Illinois	71.98	33.30	21.50	17.18	46.3	29.9	23.9
Indiana	49.96	17.46	26.50	6.00	34.9	53.0	12.0
Iowa	17.01	8.30	4.23	4.48	48.8	24.9	26.3
Kansas	16.97	7.93	1.83	7.21	46.7	10.8	42.5
Kentucky	28.08	9.13	15.40	3.55	32.5	54.8	12.6
Louisiana	56.10	25.85	0.00	30.25	46.1	0.0	53.9
Maine	5.28	5.23	0.02	0.03	99.1	0.4	0.6
Maryland	20.13	11.88	6.12	2.13	59.0	30.4	10.6
Massachusetts	27.34	25.00	0.10	2.24	91.4	0.4	8.2
Michigan	54.17	23.51	17.90	12.76	43.4	33.0	23.6
Minnesota	21.69	11.58	5.55	4.56	53.4	25.6	21.0
Mississippi	12.31	8.35	1.06	2.90	67.8	8.6	23.6
Missouri	29.96	12.82	11.70	5.44	42.8	39.1	18.2
Montana	5.36	3.23	1.05	1.08	60.3	19.6	20.1
Nebraska	8.76	4.61	1.34	2.81	52.6	15.3	32.1
Nevada	6.07	2.27	2.78	1.02	37.4	45.8	16.8
New Hampshire	3.87	3.25	0.51	0.11	84.0	13.2	2.8
New Jersey	34.62	28.12	1.76	4.74	81.2	5.1	13.7
New Mexico	11.57	3.94	3.43	4.20	34.1	29.6	36.3
New York	74.09	56.39	9.08	8.62	76.1	12.3	11.6
North Carolina	29.17	14.10	13.60	1.47	48.3	46.6	5.0
North Dakota	5.10	2.23	2.28	0.59	43.7	44.7	11.6
Ohio	81.64	25.64	41.30	14.70	31.4	50.6	18.0
Oklahoma	19.36	8.33	0.04	10.99	43.0	0.2	56.8
Oregon	7.56	6.04	0.15	1.37	79.9	2.0	18.1
Pennsylvania	85.15	32.72	42.00	10.43	38.4	49.3	12.2
Rhode Island	3.03	2.73	0.00	0.30	90.1	0.0	9.9
South Carolina	14.22	7.78	4.27	2.17	54.7	30.0	15.3
South Dakota	3.49	2.00	0.93	0.56	57.3	26.6	16.0
Tennessee	28.14	11.02	14.00	3.12	39.2	49.8	11.1
Texas	131.36	67.61	5.65	58.10	51.5	4.3	44.2
Utah	8.54	4.02	2.54	1.98	47.1	29.7	23.2
Vermont	1.66	1.60	0.01	0.05	96.4	0.6	3.0
Virginia	24.47	17.62	5.05	1.80	72.0	20.6	7.4
Washington	15.20	10.96	2.03	2.21	72.1	13.4	14.5
West Virginia	29.28	5.24	21.80	2.24	17.9	74.5	7.7
Wisconsin	23.39	11.23	7.59	4.57	48.0	32.4	19.5
Wyoming	8.43	2.78	4.47	1.18	33.0	53.0	14.0
TOTAL	1330.23	701.02	339.00	290.21	52.7	25.5	21.8

1966 Carbon Emissions from Fossil Fuels

	Total Emissions (million metric tons)	Emissions from Oil (million metric tons)	Emissions from Coal (million metric tons)	Emissions from Natural Gas (million metric tons)	Emissions from Oil (% of total)	Emissions from Coal (% of total)	Emissions from Natural Gas (% of total)
	1	2	3	4	5	6	7
Alabama	23.09	5.09	14.57	3.43	22.0	63.1	14.9
Alaska	1.89	1.30	0.41	0.18	68.8	21.7	9.5
Arizona	5.45	2.78	0.18	2.49	51.0	3.3	45.7
Arkansas	7.70	3.57	0.00	4.13	46.4	0.0	53.6
California	71.66	42.10	1.29	28.27	58.7	1.8	39.5
Colorado	9.65	3.97	2.72	2.96	41.1	28.2	30.7
Connecticut	12.36	8.27	3.40	0.69	66.9	27.5	5.6
Delaware	3.59	2.34	0.97	0.28	65.2	27.0	7.8
Florida	20.79	15.89	1.75	3.15	76.4	8.4	15.2
Georgia	15.41	7.52	4.42	3.47	48.8	28.7	22.5
Hawaii	2.83	2.83	0.00	0.00	100.0	0.0	0.0
Idaho	2.57	1.64	0.37	0.56	63.8	14.4	21.8
Illinois	61.86	22.71	26.76	12.39	36.7	43.3	20.0
Indiana	42.32	12.47	24.15	5.70	29.5	57.1	13.5
Iowa	12.53	5.92	3.13	3.48	47.2	25.0	27.8
Kansas	12.40	5.20	0.34	6.86	41.9	2.7	55.3
Kentucky	18.26	5.45	10.64	2.17	29.8	58.3	11.9
Louisiana	29.16	11.40	0.00	17.76	39.1	0.0	60.9
Maine	3.45	3.26	0.18	0.01	94.5	5.2	0.3
Maryland	17.93	8.00	8.46	1.47	44.6	47.2	8.2
Massachusetts	22.98	18.50	2.80	1.68	80.5	12.2	7.3
Michigan	47.38	16.04	22.40	8.94	33.9	47.3	18.9
Minnesota	16.50	8.43	4.28	3.79	51.1	25.9	23.0
Mississippi	7.53	3.45	0.02	4.06	45.8	0.3	53.9
Missouri	18.71	8.85	4.76	5.10	47.3	25.4	27.3
Montana	3.32	2.15	0.14	1.03	64.8	4.2	31.0
Nebraska	6.15	2.87	0.49	2.79	46.7	8.0	45.4
Nevada	2.02	1.23	0.27	0.52	60.9	13.4	25.7
New Hampshire	2.34	2.04	0.24	0.06	87.2	10.3	2.6
New Jersey	31.71	22.42	5.91	3.38	70.7	18.6	10.7
New Mexico	6.73	2.28	0.92	3.53	33.9	13.7	52.5
New York	70.08	42.61	18.26	9.21	60.8	26.1	13.1
North Carolina	20.83	10.07	9.49	1.27	48.3	45.6	6.1
North Dakota	3.26	1.91	0.90	0.45	58.6	27.6	13.8
Ohio	67.04	17.67	35.46	13.91	26.4	52.9	20.7
Oklahoma	11.98	5.55	0.02	6.41	46.3	0.2	53.5
Oregon	6.02	4.87	0.16	0.99	80.9	2.7	16.4
Pennsylvania	78.02	24.41	43.59	10.02	31.3	55.9	12.8
Rhode Island	2.88	2.37	0.26	0.25	82.3	9.0	8.7
South Carolina	9.33	4.57	3.32	1.44	49.0	35.6	15.4
South Dakota	2.28	1.75	0.13	0.40	76.8	5.7	17.5
Tennessee	18.59	6.13	9.08	3.38	33.0	48.8	18.2
Texas	86.78	37.55	0.69	48.54	43.3	0.8	55.9
Utah	6.12	2.79	1.97	1.36	45.6	32.2	22.2
Vermont	1.27	1.21	0.05	0.01	95.3	3.9	0.8
Virginia	21.48	10.04	9.65	1.79	46.7	44.9	8.3
Washington	10.08	8.02	0.28	1.78	79.6	2.8	17.7
West Virginia	19.08	3.54	12.98	2.56	18.6	68.0	13.4
Wisconsin	20.57	8.05	9.25	3.27	39.1	45.0	15.9
Wyoming	3.47	1.54	1.03	0.90	44.4	29.7	25.9
TOTAL	999.38	454.57	302.58	242.23	45.5	30.3	24.2

Key to Formulas Used in Calculating Carbon Emissions in 1986, 1976, and 1966 Carbon Emissions Matrices

The conversion factors used to determine carbon emissions from the burning of fossil fuels (oil, coal, natural gas) and the non-oxidized fuel constants were supplied by Dr. Gregg Marland from Oak Ridge National Laboratory, Oak Ridge, Tennessee. (1) The conversion factor for motor gasoline was provided by Dr. Irving Mintzer from World Resources Institute, Washington, DC. (2)

STEP 1

Conversion factors of carbon emissions from direct combustion of fossil fuels.
Oil (Crude/heating oil) = 19.9 kilograms carbon (kgC)/10^9 joules (j)
Motor Gasoline = 18.9 kgC/10^9 j
Coal = 24.12 kgC/10^9 j
Natural gas = 13.8 kgC/10^9 j

STEPS 2 & 3

To convert joules to Btu (British thermal units) multiply above figures by 1.054 x 10^3 j/Btu to get new conversion factors compatible with U.S. Department of Energy (DOE) consumption (Btu) data. Convert kgC to metric tons of carbon (t/C) by multiplying by 1 metric ton/10^3 kg.

Oil (Crude/heating oil) = $\frac{20.98\ t/C}{10^9\ Btu}$

Motor Gasoline = $\frac{19.9\ t/C}{10^9\ Btu}$

Coal = $\frac{25.42\ t/C}{10^9\ Btu}$

Natural gas = $\frac{14.55\ t/C}{10^9\ Btu}$

STEP 4

Multiply by constants to account for non-oxidized fuel. (3) Note: There is no constant for motor gasoline since it is assumed that gasoline in fully oxidized in combustion.

Oil = .918
Coal = .982
Natural gas = .98

STEP 5

Multiply by DOE 1986 energy consumption data to get million tons of carbon emissions by state. (See Column 1 of the 1986 Carbon Emissions Matrix for data.)

Sources:
(1) Conversion factors for oil, coal and natural gas from "Carbon Dioxide Emission Rates for Conventional and Synthetic Fuels," Gregg Marland, *Energy*, V.8, N.12, 1983.
(2) Conversion factor for gasoline from testimony by Dr. Irving Mintzer before the Committee on Environment and Public Works, U.S. Senate, Sept. 16, 1988.
(3) Non-oxidized combustion factors supplied by Gregg Marland, Oak Ridge National Laboratory per phone conversation 9/22/88.

Estimated Carbon Emissions from Fossil Fuels
1986, 1976, 1966 Matrix Notes

Column 1 - Total Carbon Emissions - Each state's total carbon emissions from oil, coal, and natural gas expressed in million metric tons. Column 1 is the sum of columns 2 (oil), 3 (coal), and 4 (natural gas).

Column 2 - Carbon Emissions from Oil - The data indicate the estimated amount of carbon emitted in million metric tons from the combustion of oil (including crude and heating oil, excluding asphalt and road oil). Note that the conversion factors for oil and motor gasoline vary therefore two calculations are necessary to obtain total carbon emissions from the combustion of oil.

Reference: Calculate state carbon emissions from the combustion of oil, using U.S. Department of Energy (DOE) 1986 energy consumption data* as follows (example uses 1986 Alabama data):

$$.241 \text{ quad } (10^{15})\text{Btu} \times \frac{20.98 \text{ t/C}}{10^{9} \text{ Btu}} \times .918 = 4.64 \times 10^{6} = 4{,}640{,}000 \text{ metric tons carbon}$$

Reference: Calculate the carbon emissions from each state's combustion of motor gasoline using DOE 1986 energy consumption data* as follows (example uses 1986 Alabama data):

$$244 \text{ quad } (10^{15})\text{Btu} \times \frac{19.9 \text{t/C}}{10^{9} \text{ Btu}} = 4.86 \times 10^{6} = 4{,}860{,}000 \text{ metric tons of carbon}$$

Total carbon emissions from oil (add carbon emissions from oil and motor gasoline) = 9.5×10^{6} metric tons carbon or 9,500,000 metric tons.

Column 3 - Carbon Emissions from Coal - The data indicate the estimated amount of carbon emitted in million metric tons that results from each state's combustion of coal.

Reference: Calculate the carbon emissions from each state's consumption of coal, using DOE 1986 energy consumption data* as follows (example uses 1986 Alabama data):

$$.661 \text{ quad } (10^{15}) \text{ Btu} \times \frac{25.42 \text{ t/C}}{10^{9} \text{ Btu}} \times .982 = 16.5 \times 10^{6} = 16{,}500{,}000 \text{ metric tons carbon}$$

Column 4 - Carbon Emissions from Natural Gas - The data indicate the estimated amount of carbon emitted in million metric tons from the combustion of natural gas.

Reference: Calculate the carbon emissions from each state's combustion of natural gas, using DOE 1986 energy consumption data* as follows (example uses 1986 Alabama data):

$$.210 \text{ quad Btu} \times \frac{14.55 \text{ t/C}}{10^{9} \text{ Btu}} \times .98 = 2.99 \times 10^{6} = 2{,}990{,}000 \text{ metric tons carbon}$$

* Source: "State Energy Data Report: Consumption Estimates 1960-1986," Energy Information Administration, U.S. Department of Energy, 1988.

Column 5 - Carbon Emissions from Oil as a % of Total Emissions (refers to Cols. 1 and 2).

Column 6 - Carbon Emissions from Coal as a % of Total Emissions (refers to Cols. 1 and 3).

Column 7 - Carbon Emissions from Natural Gas as a % of Total Emissions (refers to Cols. 1 and 4).

Column 8 -Tons of Carbon/Gross State Product (million dollars) - These figures were computed from the total carbon emissions (see column 1) and 1986 State gross products (GSP). Note: Column 8 appears only on the 1986 Carbon Emissions Matrix.
Source: (GSP), U.S. Dept. of Commerce, "Survey of Current Business," V.68, N. 5, May 1988.

Chloroflourocarbons/Methane

	CFC Policies	# Municipal Landfills	Recovery Operations
	1	2	3
Alabama		122	2
Alaska		179	
Arizona		96	
Arkansas		84	
California	C	400	18
Colorado		122	1
Connecticut		91	
Delaware		3	
Florida		126	3
Georgia		198	3
Hawaii		19	
Idaho		95	
Illinois		168	4
Indiana		96	
Iowa		83	
Kansas		124	
Kentucky		107	1
Louisiana		93	1
Maine	S	294	
Maryland		42	1
Massachusetts	S	203	2
Michigan		58	1
Minnesota		105	1
Mississippi		108	
Missouri		106	
Montana		129	
Nebraska		42	
Nevada		107	
New Hampshire		70	
New Jersey		73	3
New Mexico		213	
New York	C	304	7
North Carolina		124	
North Dakota		100	
Ohio		149	1
Oklahoma		123	
Oregon		127	
Pennsylvania		135	6
Rhode Island	S	11	3
South Carolina		80	
South Dakota		55	
Tennessee		120	1
Texas		926	4
Utah		112	
Vermont	S	69	
Virginia		147	
Washington		118	
West Virginia		141	
Wisconsin		933	2
Wyoming		78	
TOTAL		7,608	65

Chloroflourocarbons (CFCs)/Methane Matrix Notes

Column 1 - CFC Policies (bans or restrictions on various products containing CFCs).
S = state policy; C= county/city
Source: "Protecting the Ozone Layer: What Can You Do," Environmental Defense Fund, Washington, DC, 1988.

Column 2 - Lists the Number of Municipal Waste landfills.
Source: U.S. EPA, "List of Municipal Waste Landfills, December 1986, Compiled from EPA's State Subtitle D Program Census."

Column 3 - Landfill Gas Recovery Projects (private and municipal). Data include facilities in operation and those projected to be completed in 1989.
Source: *Waste Age*, Landfill Gas Survey, March 1988, p.167 .

Tropospheric Ozone Scorecard

	Highest Ozone Level (ppm)*	Avg. # of Days Above Ozone Std. Each Year
ALABAMA		
Birmingham	0.14	NA
ARIZONA		
Phoenix	0.14	4
CALIFORNIA		
Bakersfield	0.16	29
Fresno	0.16	21
Los Angeles	0.35	154
Modesto	0.16	12
Sacramento	0.18	9
San Diego	0.22	11
San Francisco	0.15	6
Santa Barbara	0.16	2
Stockton	0.15	8
Visalia	0.14	6
Yuba City	0.14	3
COLORADO		
Denver	0.12	1
CONNECTICUT		
Greater State	0.18	14
FLORIDA		
Jacksonville	0.14	3
Miami	0.13	2
Tampa	0.13	2
GEORGIA		
Atlanta	0.16	5
ILLINOIS		
Chicago	0.17	5
INDIANA		
Indianapolis	0.13	2
KENTUCKY		
Lexington	0.13	2
Louisville (a)	0.16	5
LOUISIANA		
Baton Rouge	0.16	4
Iberville	0.13	2
Lake Charles	0.13	1
Point Coupee	0.13	3
St. James	0.13	4
MAINE		
Gardiner	0.12	1
Hancock Cnty.	0.12	2
Knox County	0.13	2
Portland	0.14	4
York County	0.15	7

	Highest Ozone Level (ppm)*	Avg. # of Days Above Ozone Std. Each Year
MARYLAND		
Baltimore	0.15	6
MASSACHUSETTS		
Boston	0.15	3
New Bedford	0.16	5
Worcester	0.14	2
MICHIGAN		
Muskegon	0.13	3
MISSOURI		
Kansas City (a)	0.13	2
St. Louis (a)	0.16	6
NEW HAMPSHIRE		
Portsmouth (a)	0.13	1
NEW JERSEY		
Atlantic City	0.17	5
NEW YORK		
New York (a)	0.20	19
NORTH CAROLINA		
Charlotte (a)	0.13	2
OHIO		
Cincinnati (a)	0.14	1
Cleveland	0.14	3
OKLAHOMA		
Tulsa	0.13	2
OREGON		
Portland	0.14	1
PENNSYLVANIA		
Allentown-Beth	0.13	2
Philadelphia	0.17	7
RHODE ISLAND		
Providence	0.18	9
TENNESSEE		
Memphis (a)	0.13	2
Nashville	0.14	4
TEXAS		
Beaumont-P.A.	0.15	5
Dallas-Ft Worth	0.16	12
El Paso	0.16	12
Longv.-Marshall	0.11	1
Houston	0.20	19
WEST VIRGINIA		
Huntington (a)	0.14	3
WISCONSIN		
Milwaukee	0.15	4
UTAH		
Salt Lake City	0.16	5

Source: U.S. EPA 8/27/87

The 62 metropolitan areas in non-attainment for ozone, based on ozone levels from 1984-86.

Note: (a) = area

*Represents 4th highest measured ozone level, since ozone standard of .12 ppm in a one-hour period can be exceeded only once each year.

Residential/Industrial/Commercial

	Emissions Ind./Comm. (% of total)	Emissions Residential (% of total)	% Low Income Homes Weatherized	State Bldg. Codes
	1	2	3	4
Alabama	28.2	3.4	6.33	
Alaska	50.0	4.8	18.39	
Arizona	14.1	3.0	7.09	
Arkansas	26.8	5.2	10.60	
California	25.1	8.5	2.90	Y
Colorado	17.1	7.8	12.90	
Connecticut	17.0	18.3	9.87	
Delaware	22.6	6.0	11.74	
Florida	10.3	1.8	0.90	Y
Georgia	15.1	4.6	4.85	
Hawaii	10.8	0.5	12.33	
Idaho	34.5	7.7	30.01	
Illinois	31.0	12.8	7.69	
Indiana	31.7	5.7	14.83	
Iowa	28.7	10.3	19.66	
Kansas	30.1	6.2	12.83	
Kentucky	18.9	4.2	13.16	
Louisiana	58.6	1.9	2.77	
Maine	26.8	16.5	26.21	
Maryland	21.7	9.8	9.42	
Massachusetts	17.4	17.1	7.78	Y
Michigan	26.3	13.2	11.37	
Minnesota	25.0	12.8	36.42	Y
Mississippi	32.0	4.1	5.34	
Missouri	16.3	8.4	16.43	
Montana	19.3	5.2	36.87	
Nebraska	23.0	9.2	20.44	
Nevada	8.0	3.6	10.81	
New Hampshire	13.9	14.8	20.28	
New Jersey	25.2	14.0	6.43	
New Mexico	16.7	4.0	16.64	
New York	23.2	18.6	9.62	Y
North Carolina	17.2	4.9	5.78	Y
North Dakota	29.3	3.4	44.98	
Ohio	25.6	9.1	11.46	
Oklahoma	27.8	5.3	7.12	
Oregon	24.1	7.6	10.10	
Pennsylvania	26.1	10.1	16.93	
Rhode Island	21.3	24.8	16.76	
South Carolina	25.7	4.1	6.03	
South Dakota	26.0	12.2	23.09	Y
Tennessee	21.9	2.9	8.98	
Texas	43.8	2.2	3.07	
Utah	23.1	8.8	18.36	
Vermont	18.9	22.1	26.43	
Virginia	25.5	7.7	7.66	
Washington	26.3	5.3	8.73	
West Virginia	20.8	2.4	14.80	
Wisconsin	22.9	12.1	15.05	Y
Wyoming	21.5	2.2	18.09	
	27.5	7.4	9.48	

Residential/Industrial/Commercial Matrix Notes

Column 1 - Carbon emissions from the industrial/commercial sectors as a percent of the state's total carbon emissions. The data are calculated from the industrial/commercial sectors' fuel consumption of oil, coal, and natural gas.

Source for fuel consumption: "State Energy Data Report: Consumption Estimates 1960-1986," Energy Information Administration, U.S. Department of Energy, 1988. Also refer to "Key" on p. 22.

Column 2 - Carbon emissions from the residential sector as a percent of the state's total carbon emissions. The data are calculated from the residential sector's fuel consumption of oil, coal, and natural gas.

Source for fuel consumption: "State Energy Data Report: Consumption Estimates 1960-1986, Energy Information Administration, U.S. Department of Energy, 1988. Also refer to "Key" on p. 22.

Column 3 - Percent of low income residences that have been weatherized from the U.S. Department of Energy Weatherization Assistance Program (WAP).

Note: The number of low income homes weatherized is a cumulative total from 1977 to 1987. Source: U.S. Dept. of Energy, Residential and Commercial Conservation Programs, 8/16/88. The total number of low income homes eligible for weatherization is based on the 1980 U.S. Census. Source: U.S. Dept. of Health and Human Services.

Column 4 - State Building Code Provisions

Note: Although many states have minimal requirements for energy efficiency in new buildings, those with the most substantial standards are included here.

Source: National Conference of States on Building Codes and Standards (NCSBCS), Herndon, Virginia, 1986.

State/Utility Joint Energy Efficiency Projects

	Residential	Low-Income	Commercial	Non-Profit	Industrial	Agricultural
	1	2	3	4	5	6
Alabama						
Alaska						
Arizona	Y					
Arkansas						
California		Y				
Colorado						
Connecticut	Y		Y	Y		
Delaware						
Florida						
Georgia	Y	Y		Y		
Hawaii						
Idaho						
Illinois				Y		
Indiana						
Iowa	Y	Y	Y	Y	Y	Y
Kansas						
Kentucky						
Louisiana						
Maine	Y					
Maryland						
Massachusetts	Y		Y		Y	
Michigan	Y	Y	Y	Y	Y	Y
Minnesota		Y				
Mississippi						
Missouri						
Montana		Y				
Nebraska	Y	Y	Y	Y	Y	Y
Nevada						
New Hampshire						
New Jersey	Y	Y	Y	Y	Y	Y
New Mexico						
New York	Y	Y	Y	Y	Y	Y
North Carolina	Y	Y	Y	Y	Y	Y
North Dakota						
Ohio		Y				
Oklahoma		Y				
Oregon	Y	Y	Y	Y	Y	
Pennsylvania		Y				
Rhode Island	Y		Y			
South Carolina						
South Dakota						
Tennessee	Y	Y	Y	Y	Y	Y
Texas	Y					
Utah						
Vermont						
Virginia						
Washington	Y	Y	Y	Y	Y	
West Virginia						
Wisconsin		Y				
Wyoming						

State and Utility Joint Energy Efficiency Projects (JEEP) Matrix Notes

Column 1 - "Y" indicates a state/utility JEEP in the residential sector.

Column 2 - "Y" indicates a state/utility JEEP in the low income sector.

Column 3 - "Y" indicates a state/utility JEEP in the commercial sector.

Column 4 - "Y" indicates a state/utility JEEP in the non-profit sector.

Column 5 - "Y" indicates a state/utility JEEP in the industrial sector.

Column 6 - "Y" indicates a state/utility JEEP in the agricultural sector.

Source: Alliance to Save Energy, "Examples of Energy Efficiency Projects Jointly Operated by States and Utilities," August, 1988.

Note: The list of projects is not exhaustive, but indicates the range of joint projects that are currently being conducted. It serves as a partial list of initial programs. The projects are funded in part by federal energy programs (Weatherization Assistance Program, Institutional Conservation Program, and Low Income Home Energy Assistance Program).

State Energy Tax Credits

STATE	ELIGIBLE TECHNOLOGIES	CREDIT	MAXIMUM CREDIT	EXPIRES
California	Active/Passive Solar, Photovoltaic (PV)	10% commercial	none	1/1/89
Delaware	Solar Hot Water Systems	$200 credit	$200/residential	none
Hawaii	Active/Passive Solar, PV, Wind Heat Pump Water Heaters	15%residential/commercial	no limit	12/31/92
Idaho	Active/Passive Solar, Renewable Energy Systems	100% deduction/residential only (must be taken over 4 years) 40% first year, 20% following 3 years	$5000 residential per tax year	none
Massachusetts	Active Solar, PV, Wind	35% residential in 1988 25% residential, 1989-90 15% residential, 1991	$1000 residential	12/31/91
Michigan	Active Solar, PV, Wind Water Source Heat Pumps, Hydro	30% first $2000 15% next $3000 residential only for all tech.	$1050 residential	12/31/88
New Jersey	Solar	6% sales tax, other grants are available		10/31/88*
New Mexico	Solar & Wind	25% equipment	$1500 in 1988	12/31/88
North Carolina	Solar Solar Wind Hydro Methane gas Ethanol gas Wood burning conversion Cogeneration	25% res/comm 20% industrial 10% res/comm 10% res/comm 10% res/comm 20% res/comm 15% res/comm 10% res/comm	$1,000 $8,000 $1,000 $5,000 $2,500 no limit no limit no limit	none none none none none none none none
North Dakota	Active/Passive Solar, Wind, Geothermal	15% res/comm (5% per year for 3 years)	no limit	none
Oklahoma	Active/Passive Solar, Wind, PV	45 % residential in '88 40% residential in '89 35% residential in '90 30% commercial	$10,000 residential no limit commercial	12/31/90
Oregon	Active/Passive Solar, Wind Geothermal, Hydro	25% 1st $1000 in '88 & '89 35% comm. over 5 years	$1000 residential $3.5 million comm.	12/31/89 12/31/90
Rhode Island	Active/Passive Solar Wind Hydro	10% res/comm 10% res/comm 10% res/comm	$1000 residential $1500 commercial $50,000res/comm	6/30/90
South Carolina	Solar, Wind, Hydro, Wood, Biomass, other qualified renewable energy tech.	25% res/comm	$1000 res/comm	none
Utah	Solar, Hydro, PV, Wind, Biomass	25% residential 10% commercial	$1500 residential $25,000 commercial	12/31/90
	Source: NATAS, "State Energy Tax Credit Summary" (compiled from State contacts) and phone update with K. Dennehy (NATAS) 9/23/88.		* Extension under review	

1988 Air Pollution Budgets/Oil Overcharge Funds

	State and Local Air Pollution Budgets ($000s)	Federal Air Pollution Budgets ($000s)	Oil Overcharge State Allocation ($000s)	Oil Overcharge Funds for EES, SECP, ICP ($000s)	Oil Overcharge Funds for WAP ($000s)
	1	2	3	4	5
Alabama	1,855	1,639	32,192	16,166	2,900
Alaska	751	813	8,272	2,490	4,000
Arizona	3,162	1,527	21,566	17,921	2,000
Arkansas	647	785	25,950	13,658	2,100
California	92,380	7,882	194,717	51,442	0
Colorado	4,562	1,605	22,716	18,057	5,554
Connecticut	3,451	1,872	34,900	5,143	0
Delaware	552	612	9,945	3,422	2,000
Florida	6,241	2,059	98,115	39,467	153
Georgia	2,415	1,160	46,625	19,088	9,774
Hawaii	1,215	357	14,482	12,927	1,600
Idaho	302	622	8,691	4,648	2,340
Illinois	5,362	5,040	96,106	6,347	37,000
Indiana	2,468	2,703	51,631	18,783	0
Iowa	401	950	27,424	14,872	3,175
Kansas	416	923	23,958	6,455	994
Kentucky	3,222	1,600	27,439	0	5,249
Louisiana	1,865	1,283	51,536	3,035	6,000
Maine	1,221	752	15,094	7,950	4,800
Maryland	2,532	1,741	36,416	6,049	23,689
Massachusetts	1,340	2,507	70,341	15,000	28,733
Michigan	4,685	3,497	70,991	12,315	12,989
Minnesota	1,720	1,469	36,066	18,203	5,500
Mississippi	518	667	28,379	21,113	5,000
Missouri	1,814	2,078	41,516	20,014	14,333
Montana	451	957	9,585	3,797	3,200
Nebraska	235	631	15,505	3,721	0
Nevada	1,237	667	8,767	1,176	1,984
New Hampshire	302	730	9,798	8,146	660
New Jersey	5,062	3,280	75,433	22,973	0
New Mexico	900	1,081	13,693	4,200	4,486
New York	7,372	5,193	159,875	107,861	34,053
North Carolina	3,242	1,849	47,030	6,975	7,400
North Dakota	195	533	7,721	2,283	1,813
Ohio	7,566	4,345	79,740	10,375	34,624
Oklahoma	740	1,225	26,234	9,168	5,197
Oregon	2,509	2,065	20,722	6,838	12,447
Pennsylvania	7,537	4,987	96,804	12,478	0
Rhode Island	300	625	8,005	5,059	893
South Carolina	1,544	1,170	25,188	1,774	0
South Dakota	157	470	7,502	9,932	1,000
Tennessee	2,853	2,072	34,603	12,994	22,500
Texas	13,939	5,119	157,187	40,903	1,750
Utah	609	1,188	12,454	3,223	1,500
Vermont	242	477	5,005	1,950	1,758
Virginia	3,847	2,089	53,377	6,897	10,200
Washington	3,379	2,844	32,122	15,676	7,698
West Virginia	754	1,130	12,903	1,192	2,184
Wisconsin	2,944	2,006	36,967	0	10,922
Wyoming	560	491	8,874	102	2,000
Total	213,573	93,367	2,060,162	654,257	348,152

FY '88 Air Pollution Control Budgets/Exxon Overcharge Funds

Column 1 - FY '88 Air Pollution Control Budgets: State and local contributions ($000s) Source (columns 1 and 2): U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Air Quality Management Division, Research Triangle Park, NC, 10/7/88.

Column 2 - FY '88 Air Pollution Control Budgets: Federal contribution including FY '87 carryover and unexpended funds ($000s). Source: See Column 1.

Exxon Oil Overcharge Funds (Columns 3 -5) Funds received by the States from settlement of the Exxon oil overcharge case may be used by the States under one or more of four energy conservation grant programs administered by the Dept. of Energy.

Column 3 - Total State Allocation of Oil Overcharge Funds ($000s). Source (cols. 3-5): U.S. Dept. of Energy, Office of State and Local Assistance Programs, 9/22/88.

Column 4 - Oil Overcharge Funds Approved for Energy Extension Service (EES), State Energy Conservation Program (SECP), and the Institutional Conservation Program (ICP). The figures, expressed in $000s, are cumulative totals from March 1986 to Sept. 1988. Source: See Column 3.

Column 5 - Oil Overcharge Funds Approved for Weatherization Assistance Program (WAP). The figures, expressed in $000s, are cumulative totals from March 1986 to September 1988. Source: See Column 3.

State Miles Per Gallon

	Estimated State MPG	Vehicle Miles Traveled (millions)	Gallons Motor Fuel Use (000s)
	1	2	3
Alabama	14.3	34,003	2,378,826
Alaska	12.8	4,008	313,365
Arizona	11.8	22,665	1,920,968
Arkansas	11.7	17,555	1,506,274
California	15.7	214,913	13,671,898
Colorado	14.9	26,382	1,766,814
Connecticut	15.3	24,053	1,571,167
Delaware	14.9	5,762	386,611
Florida	13.7	87,273	6,380,298
Georgia	14.1	56,833	4,043,074
Hawaii	18.9	6,971	368,505
Idaho	13.6	7,781	571,385
Illinois	13.7	74,144	5,398,459
Indiana	12.4	40,780	3,290,247
Iowa	12.4	20,413	1,646,257
Kansas	13.1	19,821	1,509,013
Kentucky	13.3	29,252	2,201,426
Louisiana	11.9	29,861	2,512,473
Maine	14.1	10,022	711,570
Maryland	15.1	35,208	2,327,090
Massachusetts	15.1	40,745	2,701,906
Michigan	15.6	71,981	4,624,070
Minnesota	14.9	33,806	2,270,846
Mississippi	12.7	19,226	1,517,459
Missouri	12.9	41,571	3,214,541
Montana	14.1	7,737	547,584
Nebraska	12.9	12,630	975,538
Nevada	12.7	7,986	626,446
New Hampshire	14.9	7,913	531,968
New Jersey	14.1	55,350	3,929,915
New Mexico	13.5	13,171	978,146
New York	14.5	94,716	6,519,533
North Carolina	14.1	52,866	3,751,030
North Dakota	12.2	5,632	460,453
Ohio	14.4	81,348	5,641,286
Oklahoma	14.5	30,833	2,125,806
Oregon	14.7	22,741	1,544,366
Pennsylvania	14.6	77,636	5,313,800
Rhode Island	12.6	5,429	431,162
South Carolina	13.9	28,250	2,025,805
South Dakota	12.9	6,238	483,614
Tennessee	12.6	39,521	3,130,831
Texas	14.0	148,348	10,579,296
Utah	13.4	12,100	900,442
Vermont	16.3	4,778	293,686
Virginia	15.6	51,726	3,318,366
Washington	15.3	35,993	2,354,252
West Virginia	14.1	13,181	936,814
Wisconsin	15.9	38,428	2,414,994
Wyoming	12.1	5,373	443,256
U.S.	14.2	1,834,953	129,062,931

State Miles Per Gallon Matrix Notes

Column 1 - Estimated State MPG
Based on 1986 gallons of gasoline consumed and vehicle miles traveled as shown in columns 2 and 3. These figures include automobiles, trucks and buses. Source: "Highway Statistics 1986," U.S. Department of Transportation (DOT), Washington, DC.

Column 2- Vehicle Miles Traveled (millions)
Source: "Highway Statistics 1986," TableVM-2, U.S. DOT, Washington, DC.

Column 3 - Motor Fuel Use (thousands of gallons)
Source: "Highway Statistics 1986," Table MF-21, U.S. DOT, Washington, DC.

Reforestation

	Acid Rain Programs	Forest Land Acres (000s)	% State Land Forested	Change in Forest Acres 1977-87 (000s) (% Change)	CRP Acres in Trees (% of Total Enrolled Acres)	Reforest Mgmnt.
	1	2	3	4	5	6
Alabama	2	21,725	67%	+364 (2%)	225,197 (52%)	****
Alaska		129,045	36%	No Data	0 (0%)	*
Arizona	2	19,384	27%	+891 (5%)	*0	**
Arkansas	2	16,987	51%	- 1204 (7%)	76,582 (49%)	*
California	2,4	39,381	39%	-771 (2%)	652 (.4%)	*****
Colorado	2	21,338	32%	-933 (4%)	636 (.03%)	**
Connecticut	2	1,815	59%	-45 (2%)	*0	*
Delaware		398	33%	+6 (2%)	116 (26%)	**
Florida	2	16,549	48%	- 490 (3%)	84,388 (91%)	***
Georgia		23,907	65%	- 1349 (5%)	470,392 (92%)	****
Hawaii		1,748	43%	-238 (12%)	0 (0%)	**
Idaho	2	21,818	41%	+ 92 (0%)	1048 (.1%)	****
Illinois	2	4,265	12%	+ 455 (12%)	8463 (2%)	***
Indiana	2	4,439	19%	+ 497 (13%)	4677 (2%)	***
Iowa		1,562	4%	+ 1 (0%)	6,923 (.5%)	***
Kansas		1,358	3%	+ 14 (1%)	2,080 (.09%)	nd
Kentucky	2	12,256	48%	+ 96 (1%)	1,802 (.5%)	**
Louisiana		13,883	49%	- 675 (5%)	33,445 (43%)	**
Maine	2	17,713	90%	- 5 (0%)	1690 (6%)	**
Maryland	2,4	2,632	42%	- 21 (1%)	844 (12%)	***
Massachusetts	1,2	3,097	62%	+ 145 (5%)	10 (40%)	****
Michigan	*,2	18,220	50%	-1050 (5%)	6,476 (5%)	***
Minnesota	1,2	16,583	33%	- 126 (1%)	32,691 (2%)	****
Mississippi		16,693	55%	- 22 (0%)	298,861 (55%)	***
Missouri	2	12,523	28%	- 353 (3%)	4,183 (.3%)	***
Montana	2	21,910	24%	- 649 (3%)	1,188 (.05%)	***
Nebraska		722	1%	- 307 (30%)	1,686 (.15%)	**
Nevada	2	8,928	13%	+ 1245 (16%)	0 (0%)	***
New Hampshire	1,2	5,021	88%	+ 8 (0%)	*0	**
New Jersey	2	1,985	43%	+ 57 (3%)	0 (0%)	**
New Mexico	2	18,526	24%	+ 467 (3%)	0 (0%)	****
New York	1,2	18,775	62%	+ 1557 (9%)	2,130 (5%)	**
North Carolina	2	18,891	61%	- 1152 (6%)	60,226 (58%)	***
North Dakota	2	460	1%	+ 39 (9%)	747 (.04%)	*
Ohio	2	7,397	28%	+1251 (20%)	5,797 (4%)	***
Oklahoma		8,971	20%	+ 458 (5%)	528 (.05%)	**
Oregon	2	28,055	46%	- 1755 (6%)	1,078 (.2%)	*
Pennsylvania	*,2,3	16,997	59%	+ 172 (1%)	1,619 (3%)	**
Rhode Island	2	399	60%	- 5 (1%)	*0	*
South Carolina		12,257	64%	+ 8 (0%)	164,629 (80%)	***
South Dakota		1,690	3%	- 12 (1%)	795 (.08%)	**
Tennessee	2	13,258	50%	+ 98 (1%)	18,337 (5%)	*
Texas		23,330	14%	+ 51 (0%)	10,740 (.3%)	***
Utah	2,3	16,234	31%	+ 677 (4%)	0 (0%)	**
Vermont	*,2	4,479	76%	- 32 (1%)	0 (0%)	**
Virginia		15,968	63%	- 449 (3%)	20,661 (42%)	***
Washington	2,4	21,856	51%	- 1325 (6%)	1,010 (.1%)	***
West Virginia		11,942	78%	+ 274 (2%)	21 (4%)	**
Wisconsin	1,2	15,319	44%	+ 412 (3%)	29,561 (7%)	***
Wyoming	2,3	9,966	16%	- 62 (1%)	8 (.003%)	**

Reforestation Matrix Notes

Column 1 - Acid Rain Control Programs
"1" designates that the state has an acid rain deposition control program in place. "2" designates that the state participated in EPA STAR (State Acid Rain) Program which involves research, policy analysis and EPA cooperation with States to analyze implementation issues. "3" designates that the State Governo" has appointed a research task force. "4" designates that the state legislature has mandated research programs. "*" designates that state has sulfur dioxide emissions controls.
Sources: "Acid Rain: The View From the States," p. 100 and p. 118. Phone conversation with Brian McLean, EPA STAR Program, 9/29/88. "Summary of Acid Rain Laws," State and Territorial Air Pollution Program Administrators, December 1986.

Column 2 - Total Forest Land Area, 1987 (thousands of acres).
Source: U.S. Department of Agriculture (USDA), Forest Service, "Analysis of the Timber Situation in the U.S. 1989-2040 (Draft)."

Column 3 - Percent of State Land Area Covered by Forests.
Source for land area, USDA Soil Conservation Service, 1982 Natural Resource Inventory.

Column 4 - Change in Total Forest Land Area, 1977-1987(thousands of acres).
Numbers may not be precise due to some changes in forest land classification. Sampling errors will also be greater in states with small forestland acreages. Alaska's numbers are not comparable over time due to significant improvements in recent inventories, which have identified some 10 million new acres of forestland.
Source: USDA, Forest Service, "Analysis of the Timber Situation in the United States, 1952-2030 and 1987-2040."

Column 5 - Acres of Farmland Planted to Trees through the Conservation Reserve Program (CRP), May 1988, and the percent this represents of the total acreage enrolled in each state in the CRP. *0 indicates that a state had no acres enrolled in the CRP.

In the program, farmers are paid a fee to remove highly erodible cropland from production for a least 10 years and to cover the land with a soil-conserving crop, such as trees, legumes, or grasses. The CRP has been hailed as the greatest tree planting program in the history of the Nation, yet tree planting has fallen short of the original goals set forth in the1985 Farm Bill, i.e. that 12.5% of the the total enrolled CRP acres be converted to trees.
Source: USDA Agricultural Stabilization and Conservation Service, May 1988.

Column 6 - Reforestation Management
Score given to states based on the management mechanisms used to promote natural and artificial reforestation on private forestland. A score of 5* is highest and 1* lowest. "nd" = no data. (1) Management mechanisms included are educational programs, voluntary guidelines, financial and tax incentives, and legal regulations. States that used a combination of these mechanisms were ranked higher, with legal regulation, tax and financial incentives receiving greater weight. (2)
Sources: (1) Ranking by Rick Magder, Renew America, Washington, DC, October 1988.
(2) Paul Ellefson, University of Minnesota professor of forest economics and policy, unpublished state-by-state survey for "State Forest Practice Regulation in the United States: Administration, Cost and Accomplishments," 1986.

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